

**REVIEW OF THE 2001
INVESTIGATION AND CLEANUP OF
THE MIDWAY VILLAGE RESIDENTIAL
COMPLEX IN DALY CITY,
CALIFORNIA**

July 2006
Revised October 2006



**Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment
California Environmental Protection Agency**

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Executive Summary

The Midway Village housing complex in Daly City is comprised of 35 multi-family townhouse style buildings on approximately 18 acres. The land upon which the housing is built is contaminated with chemical residues from a former manufactured gas plant that operated in the early 1900s. Investigation and cleanup of contamination at the complex was conducted by the Department of Toxic Substances Control (DTSC), the agency within the California Environmental Protection Agency (Cal/EPA) that oversees remediation of hazardous waste sites. This work was initiated in 1989 and was completed in May 2003.

In response to ongoing community concerns about the remediation, the Cal/EPA Interagency Working Group on Environmental Justice met on October 25, 2005, to discuss the history of the Midway Village investigation, the procedures adopted to remediate the contamination, and the steps taken to address the health concerns of the residents.

Dr. Alan Lloyd, the Secretary of Cal/EPA at that time, then requested that the Office of Environmental Health Hazard Assessment (OEHHA) conduct an evaluation to examine whether the remedial actions were adequate to fully protect the health of residents living at the Midway Village complex. This task was carried out by the Integrated Risk Assessment Branch of OEHHA. One of the primary objectives of this review was to determine whether the 2001-02 removal action was protective of the health of Midway Village residents. Evaluation criteria were the application of sound science, consistency with the current practice of human health risk assessment, and concordance with state and federal guidelines for management of health risks at properties contaminated with hazardous chemicals.

The Cal/EPA Interagency Working Group on Environmental Justice also invited members of the Cal/EPA Environmental Justice Advisory Committee (CEJAC) and the community to participate in this review and evaluation process. A Review Committee consisting of three members of the CEJAC, a community consultant and a toxicologist from DTSC was assembled to critically review and provide technical comment on the evaluation report.

OEHHA reviewed more than 30 background documents dealing with contamination at Midway Village. Based on this information, we have concluded that the nature and extent of contamination by non-volatile polycyclic aromatic hydrocarbons (PAHs) in accessible surface soil were adequately characterized for the purpose of making informed risk management decisions. While non-volatile PAHs at concentrations well above the target cleanup goal still remain in subsurface soil as well as soil beneath the residences and pavement, the opportunity for exposure to these contaminants has been substantially reduced, and eliminated in many cases. That is, it is very unlikely that the residents will ever be exposed to these contaminants, and the associated health risks have been minimized as well. Health risks associated with several other classes of potential contaminants – polychlorinated biphenyls (PCBs), phenolic compounds and cyanide

compounds – also appear to be non-significant, either because the opportunities for exposure have been substantially reduced or because the concentrations detected in soil are very low. Health risks associated with exposure to volatile PAHs and volatile organic compounds (VOCs) have not been shown to be significant, but this conclusion cannot be verified because the data available for these compounds are insufficient. Consequently, we are recommending that DTSC conduct an investigation of volatile compounds in soil gas and determine whether they have the potential to attain unacceptably high concentrations in the indoor air of Midway Village residences. If the results of the soil gas investigation indicate that indoor exposures may be significant, then a follow-up evaluation of indoor air exposure may be warranted.

Our review finds that the remedial actions taken at Midway Village were consistent with existing federal and state guidelines at the time they were taken for management of health risks in residential areas where soil is contaminated with hazardous chemicals. OEHHA also finds the investigation and remedial actions performed by DTSC, and ongoing maintenance of exposure barriers (e.g., asphalt pavement), are sufficient to limit or prevent exposure to non-volatile contaminants in surface and sub-surface soil that would pose a health risk to residents of the community. To ensure that this continues to be the case, strict adherence must be paid to ongoing maintenance programs and institutional controls on construction and excavation. Inspections need to be conducted on a routine basis to verify the integrity of all paved surfaces. As noted above, OEHHA believes a data gap still exists with respect to volatile compounds and additional investigation of the potential presence of these compounds in soil is strongly recommended.

Some members of the Review Committee have suggested that a baseline investigation of the health of Midway Village residents may be warranted. To explore this possibility, OEHHA contacted public health experts from the California Department of Health Services (DHS). DHS believes that such a study would have great limitations, and the chance that it would generate useful results is small. This issue is not discussed in the report but is addressed in the response to comments (Appendix B).

Background

This report summarizes the results and conclusions of OEHHA's review of the investigation and remediation of contamination at the Midway Village housing complex. The review was conducted at the request of the California Environmental Protection Agency's Interagency Working Group on Environmental Justice. The initial review was conducted by Dr. Charles Salocks, OEHHA Staff Toxicologist, over a period from December 21, 2005 through January 25, 2006. A review draft summarizing the results of OEHHA's analysis was completed on January 31, 2006, and submitted to members of the Midway Village Review Committee and the general public for review. On February 15, 2006, a meeting of the Review Committee, residents of Midway Village and other interested parties was held in Oakland. The report was revised, taking into consideration comments submitted by Review Committee members and the public. OEHHA's revised analysis is presented below. Final comments from individual members of the Review Committee are included in Appendix D.

Scope of Review

OEHHA was asked to review available reports and documents describing the 2001-02 investigation and cleanup of contamination at the Midway Village housing complex in Daily City, California. As stated in a December 13, 2005 letter to members of the Midway Village Review Committee, the primary objective of OEHHA's review was "...to determine if the scientific process used in the evaluation and cleanup was protective of the health of local residents." Accordingly, OEHHA reviewed more than 30 documents, dating from 1990 through 2005, that describe the analysis of soil, air, and groundwater samples collected at the site; the qualitative and statistical evaluation of the resulting data; the assessment of potential adverse effects on human health; and the effectiveness of the remedial strategies that were chosen to mitigate the risks to residents of the complex. A bibliography of the documents that were reviewed is attached to this report.

Site Description and History of Previous Investigations

The Midway-Bayshore site consists of the Midway Village housing complex, Bayshore Park, and the Bayshore Childcare Center. The housing complex, consisting of 150-units of residential housing units in 35 townhouse-style buildings, occupies approximately 13.8 acres of land (Ecology and Environment, 1993; p. 2-1). Bayshore Park, which occupies the northeast portion of the property, is a 3.8-acre recreational facility that includes a baseball diamond. The daycare center is located near the center of the 17.6-acre land parcel, between the housing complex and the Bayshore Park.

The land on which the housing complex stands is immediately adjacent to a former manufactured gas plant (MGP) that produced light gas components from the heavier oil. The plant operated from 1905 to 1916. In addition to producing gas for residential, commercial and industrial use, operations at the plant generated tars and lampblack,

which contain a class of chemical compounds collectively referred to as PAHs.¹ For the three decades that followed closure of the MGP, little information on land use appears to be available. In the mid-1940's, soil contaminated with PAHs was removed from the former MGP property and used to grade an adjacent piece of property for construction of Navy housing. In 1976-77, the Navy housing was demolished and the Midway Village complex was constructed. As a consequence, significant portions of the Midway Village complex were constructed on land contaminated with PAHs.

A more detailed history of previous investigations and remedial actions taken at the complex, excerpted from the September 2002 *Removal Action Completion Report* prepared by Engineering/Remediation Resources Group, Inc. (ERRG), is attached to this report (Appendix A). A subsequent investigation of PAHs in indoor air was completed after ERRG's historical review was prepared. The results of that study and an evaluation of the potential cancer risks associated with inhalation of naphthalene indoors are discussed separately below.

Scope of Previous Investigations

Adequacy of Site Characterization

Over the past 15 years, hundreds of soil, groundwater and air samples have been collected at Midway Village and Bayshore Park, and analyzed for a variety of potential contaminants. The design and results of each investigation are described briefly below.

- **Soil Sample Data Report (CH2M Hill, 1990).** In September and December 1989, a total of 34 soil samples were collected: five discrete surface samples, 28 composite surface samples, and one hand auger sample from a depth of two feet below ground surface (bgs). All samples were analyzed for individual PAHs using U.S. EPA Method 8310. Discrete samples and the single hand auger sample were also analyzed for total cyanide using U.S. EPA Method 9010. The hand auger sample was the only one analyzed for VOCs. All samples were collected from the northern half of Midway Village. PAHs were detected in all but one sample; the maximum detected *total* PAH concentration was 107.6 mg/kg. Cyanide compounds were detected in all five discrete samples and the hand auger sample; the maximum detected concentration was 3.1 mg/kg. VOCs were not detected in the single hand auger sample.
- **Soil Sampling Report (Applied Consultants, 1990).** In mid-August of 1990, an investigation was conducted on behalf of the San Mateo County Housing Authority to determine the appropriate disposal of soil excavated during trenching for a drainage system. Two composite samples were collected from soil piles and three composite samples were collected from the trench walls. Two weeks later, nine additional discrete samples were collected from soil piles and trench walls. Samples were collected from both the northern and southern portions of Midway Village. All sample were analyzed for individual PAHs using U.S. EPA Method 8270. PAHs

¹ PAHs are also referred to as Polynuclear Aromatic (PNA) compounds. PAH is currently the preferred term for this class of compounds.

were detected in 10 of the 14 samples collected. The maximum detected *total* PAH concentration was 109.6 mg/kg.

- **Remedial Investigation Report (Ecology and Environment, 1993).** Between September 1992 and March 1993, 70 discrete surface samples were collected from the upper two inches of soil and analyzed for individual PAHs by U.S. EPA Method 8310, total cyanides (i.e., the sum of soluble cyanide salts and some insoluble cyanide complexes) by U.S. EPA Method 9010, and total phenols (i.e., the sum of all compounds containing a phenolic moiety) by U.S. EPA Method 9065.² Wherever possible, surface samples were collected from apparent high-use areas where bare ground was visible. In addition, 80 discrete subsurface samples were collected from 20 borehole locations at depths of 2, 5, 7.5 and 10 feet bgs and at 5-foot intervals thereafter. All subsurface samples were analyzed for PAHs by U.S. EPA Method 8310. Samples from two feet bgs were analyzed for total phenols, total cyanides, and VOCs by U.S. EPA Method 8020. Nineteen background surface soil samples were collected from non-residential open spaces and off-site residential areas. PAHs were detected in 69 of 70 on-site surface samples. The concentration range for *total* PAHs was 0.1 to 176 mg/kg. In the subsurface, PAHs were detected in 46 of the 80 samples collected. The concentration of *total* PAHs was as high as 626 mg/kg. PAHs were also detected in 17 of the 19 background samples. The maximum background concentration of *total* PAHs was 1.0 mg/kg.³ Data for total phenols and total cyanides are summarized and discussed in a separate section below. Four groundwater samples were collected from three monitoring wells that had been installed to a maximum depth of 25 feet bgs. PAHs were detected in three of four groundwater samples collected. The maximum concentration of *total* PAHs was 33.5 µg/L. Benzene was detected on one sample at a concentration of 2.1 µg/L.⁴ Three samples had detectable amounts of diesel range petroleum hydrocarbons (TPH_{diesel}); the maximum concentration was 130 µg/L. None of these three samples had detectable amounts of gasoline-range petroleum hydrocarbons. Data from analysis of air samples collected on- and off-site were unremarkable: the average concentration of airborne *total* PAHs detected eight on-site samples was approximately 25 percent less than the concentration detected in four off-site samples.
- **Data Summary Report (URS, January 2001).** Over a period of four days in June 2000, a total of 426 soil samples were collected from 150 locations around the townhouses, the daycare center and the Midway Village Housing Office. At 145 of these locations, samples were collected from the surface (up to six inches bgs) and from two feet bgs. Samples were collected from locations throughout the complex (northern and southern portions). Samples were collected by URS (an engineering

² Note that data from Methods 9010 and 9065 cannot be used for health risk assessment because they represent the summed concentrations of many compounds that have common structural characteristics.

³ "Final Remedial Action Plan for Midway Village," Section 3.1.3 (Ecology and Environment, August 13, 1993)

⁴ "Final Remedial Action Plan for Midway Village," Section 3.2.1 (Ecology and Environment, August 13, 1993). Benzene was detected in Well W-2, one of three groundwater monitoring wells installed during the remedial investigation.

consulting firm) and analyzed by its contract laboratory. In addition, two separate sets of quality assurance/quality control samples (duplicates) were collected by U.S. EPA and DTSC. Surface samples were analyzed for individual PAHs (using U.S. EPA Methods 8310 and 8270/SIM), lead and arsenic (using U.S. EPA Method 6010), individual phenolic compounds (using U.S. EPA Method 8270), and total cyanide compounds (using U.S. EPA Method 9010). Samples collected from two feet bgs were analyzed for PAHs only. At five locations in the Cypress Lane area (at the northern end of the complex), samples were collected at four intervals to a maximum depth of five feet. Consistent with regulatory changes that had taken place since the 1993 Remedial Investigation, data for PAHs were expressed as benzo(a)pyrene equivalents [B(a)P_{eq}] in order to account for the different carcinogenic potencies of individual PAH compounds. In shallow soil, maximum detected B(a)P_{eq} concentration was 16 mg/kg. In samples collected at two feet bgs, the maximum B(a)P_{eq} concentration was 28 mg/kg. The maximum detected concentrations of lead and arsenic were 108 and 6 mg/kg, respectively. Both metals were detected in nearly all samples analyzed. Data for total phenols and total cyanides are summarized and discussed in a separate section below.

- **Data Summary Report Addendum (URS, August 2001).** To confirm selected sample results from the June 2000 investigation and to address possible data quality concerns expressed by U.S. EPA, an additional round of sampling was conducted in May 2001. A total of 60 samples were collected from 17 locations in the complex. All of these locations were in the vicinity of Cypress Lane, primarily around Buildings 21, 22, 26, 27, 28 and 29. All samples were collected from the upper five feet of soil. Thirteen locations were chosen to validate previous results as they were all within one foot of locations sampled in June 2000. The remaining four locations were all within the backyards of the units in Building 22. All samples were analyzed for PAHs by U.S. EPA Method 8270. However, the report notes that results from the June 2000 sampling event "...indicated strong matrix interference due to the presence of hydrocarbons in many of the samples."⁵ Therefore, most of the samples collected in May 2001 were also analyzed by U.S. EPA Method 8270/SIM because this method is "...generally less susceptible to hydrocarbon matrix interference problems." Additionally, all samples analyzed by either method underwent cleanup by gel permeation chromatography prior to analysis. Nine of the 60 samples had B(a)P_{eq} concentrations that exceeded the 0.9 mg/kg screening level. Six of the nine exceedances were found in surface soil samples, and samples from three of the four backyard locations exceeded the screening level. The maximum B(a)P_{eq} concentration was 92.4 mg/kg, detected in a sample collected at 4.5 feet bgs.
- **Removal Action Completion Report (ERRG, 2002).** As part of the 2001-02 removal action, verification samples were collected from the floor of the excavations at a rate of approximately one sample per 2,500 square feet (i.e., a 50 x 50 foot area). Verification samples were analyzed for PAHs using U.S. EPA Method 8310 with gel

⁵ Possible matrix interference was noted in a November 28, 2000 letter from Bart Simmons, Chief of DTSC's Hazardous Materials Laboratory, to Karen Toth, DTSC Project Manager for Midway Village. A copy of this letter was attached to the January 2001 Data Summary Report prepared by URS.

permeation chromatography cleanup. Eighty-six excavation floor samples were collected; the maximum B(a)P_{eq} concentration detected was 62.8 mg/kg. Additionally, 16 samples of excavated soil were collected to determine appropriate waste classification (i.e., hazardous or non-hazardous). All 16 samples were analyzed for metals; five were analyzed for polychlorinated biphenyls (PCBs) by U.S. EPA Method 8082; and 14 were analyzed for PAHs by U.S. EPA Method 8310. PCBs (as Arochlor 1254) were detected in one sample at a concentration of 47 µg/kg⁶. PAHs were not detected in most samples. The only carcinogenic PAH detected was naphthalene, which was identified in two of the 14 samples analyzed.

- **Indoor Environmental Inspection Report (Indoor Environmental Engineering, 2002).** In June 2002, indoor air samples were collected at five Midway Village residences, the Midway Village Homeowners Association Office, the Bayshore Childcare Center, and two schools located near the Midway Village complex (Bayshore Elementary and Robertson Intermediate). At most of the indoor sampling locations, an outdoor air sample was also collected for comparison purposes. Samples were collected for a minimum of 24 hours. In each of the five residential units, the gas-fired furnace was operated during the sampling period. An operating furnace produces a “stack effect,” creating relatively negative air pressure indoors and drawing contaminants in from outside (including VOCs present in soil beneath the structure). Contaminants were adsorbed onto cartridges containing XAD-s resin and polyurethane foam. Samples were analyzed for PAHs using U.S. EPA Method TO-13. In general, the maximum indoor concentrations of individual PAHs did not exceed 1 ng/m³. With one exception, none of the PAHs detected at a concentration greater than 1 ng/m³ were carcinogenic. The only carcinogenic PAH detected was naphthalene, at a maximum concentration of 151 ng/m³ (detected in a sample collected at the Midway Village Housing Office). The maximum concentration of naphthalene detected outdoors was 23 ng/m³. The health risks associated with indoor exposure to naphthalene are addressed separately below.
- In a summary the history of previous site investigations, the *Midway Village/Bayshore Park Removal Action Completion Report* (Engineering/Remediation Resources Group, 2002) cites two limited studies that were completed by DTSC in the early 1990s. In August 1990, DTSC collected six soil samples from around the daycare center, the baseball diamond at Bayshore Park and a playground in the southern half of the complex. The maximum detected concentration of *total* PAHs was 1.4 mg/kg. In 1992, seven more samples were collected from around the daycare center and the baseball diamond. The maximum detected concentration of *total* PAHs was 10 mg/kg. These results are summarized from information in the 2002 ERRG report. OEHHA did not review the original reports of these studies.

In nine investigations carried out over a 14 year period, more than 800 soil samples were collected at the Midway Village/Bayshore Park complex. The great majority of these samples were collected in the upper two feet of soil, and most of the remaining samples

⁶ The U.S. EPA Region 9 Preliminary Remediation Goal for “PCBs (unspeciated mixture, high risk, e.g., Arochlor 1254)” is 220 µg/kg.

were collected in the upper five feet. Since the entire complex covers approximately 17.6 acres (Ecology and Environment, 1993), the cumulative sampling density is more than 45 samples per acre. Since samples were not collected beneath buildings or paved areas, the sampling density for accessible areas was considerably higher. Furthermore, a biased approach was used to select sampling locations, so the density of sampling was even greater in the northern portion of the complex where higher concentrations of PAH contaminants were shown to exist. In our experience, few hazardous waste sites, including sites where residential housing and schools have been constructed, have a sampling density as great as this.

Although standard site investigation practices were followed, it is clear that the full lateral and vertical extent of contamination at the site was not completely characterized. For example, samples collected from the floor and trench walls of excavated areas indicated the presence of PAHs at concentrations well in excess of the target remediation goal [0.9 mg/kg B(a)P_{eq}]. Furthermore, soil beneath the residences and paved areas was not sampled, and it is almost certain that PAH concentrations in these locations exceed the target remedial goal in some areas, just as they were in samples collected from the floors and walls of areas excavated during the 2001-02 removal action. However, since PAHs are not readily mobile in soil and for the most part non-volatile, exposure to these contaminants would not be expected except under highly unusual circumstances (for example, if excavation of soil beneath pavement or a foundation were required for a major repair of utility lines). The 2002 indoor air study examined potential exposure to volatile PAHs, particularly naphthalene, in residential indoor air. Health risks associated with inhalation of naphthalene in indoor air are discussed in detail below.

Based on the high density of surface and sub-surface sampling, the variety of potential contaminants that were analyzed, and the technical sophistication of the analytical methods that were used, OEHHA believes that the environmental samples that were collected over a 14 year period are sufficient to adequately characterize the potential exposures to non-volatile PAHs, phenolic compounds, and cyanide compounds. For these classes of compounds, we conclude that the site has been adequately characterized for the purpose of making informed risk management decisions. Some Midway Village residents also expressed concerns about potential exposure to PCBs. While minimal effort was taken to characterize potential presence of PCBs in soil, we believe the remedial actions that have already been taken to prevent exposure to non-volatile PAHs are sufficient to prevent exposure to PCBs (if present) as well. OEHHA believes that the investigation of the potential presence of volatile PAHs and other VOCs was not adequate to fully characterize the presence (or lack thereof) of these compounds in soil. Therefore, we are recommending additional sampling for these compounds.

Comments on Biased Sampling Strategy

In the site investigations that were conducted in the early to mid-1990s, historical information and visual evidence of contamination (discolored soil) provided a basis for biased selection of sample locations. As noted in Agency for Toxic Substances and Disease Registry's 1999 Health Consultation, "This biased selection lends itself to a maximum exposure estimate by targeting areas where contamination is likely to be

highest.” This statement is probably correct if one defines the exposure scenario as all residents having an equal chance of contacting soil anywhere in the entire complex. However, in a complex as large as Midway Village, we would regard such a scenario as unlikely. In fact, the levels of PAH contamination were not uniformly distributed across the entire complex; soil in the northern portion was much more heavily contaminated than soil in the southern half of the complex. Furthermore, children and adults are both more likely to contact soil that is in close proximity to their own residence. Therefore, while exposure estimates and consequent health risks to residents in the southern portion of the complex may have been over-estimated, they were very likely to be valid and appropriate for residents living in the northern portion.

Potential Data Gaps: Identification of Chemicals of Potential Concern (COPCs) and Screening Level Risk Estimates

A critical step in conducting a human health risk assessment is the identification of chemicals of potential concern (COPCs). In this process, analytical data for all contaminants detected during the remedial investigation are evaluated to identify those that are related to previous site activities (in this case, MGP operations), and those that are present as a result of non-site related activity. For example, if PAHs had been detected in Midway Village soil at concentrations equivalent to background, one would be justified in concluding that the proximity of the complex to a former manufactured gas plant did not cause soil to become contaminated with PAHs. In this hypothetical example, PAHs would not be identified as COPCs.

In the 1993 Public Health and Environmental Evaluation (PHEE), COPCs were identified by comparing detected concentrations of individual contaminants in soil with Preliminary Remediation Goals (PRG), developed by the Region 9 Office of the U.S. EPA. This is not an uncommon practice, but in fact it is an inappropriate use of PRGs because the cumulative effect of concurrent exposure to multiple contaminants is not considered. In addition, 18 PAH compounds were detected but just 13 had PRGs, so five PAHs were not evaluated as COPCs. Nevertheless, a conservative approach was adopted: the maximum detected concentration of each PAH was compared to its PRG, and all 18 PAHs detected in at least one surface soil sample were identified as COPCs. Therefore, the risk estimates in the PHEE were based entirely on the concentrations of PAHs.

Cyanide Compounds

Other compounds and compound classes were also detected in site investigations conducted prior to preparation of the PHEE. For example, phenolic compounds, cyanides and volatile organic compounds were all detected in previous investigations at greater frequencies and higher concentrations than were observed for background samples.

Cyanide compounds are commonly found in soils at former MGP sites (e.g., Shifrin *et al.*, 1996). During the 1992-93 Remedial Investigation, cyanide compounds were detected in 17 of the 70 Midway Village surface soil samples at concentrations ranging from 1 to 41 mg/kg. They were not detected in any of the 17 background samples.

Cyanide compounds were also detected in 25 of 184 surface soil samples collected during the June 2000 investigation at a maximum concentration of 9 mg/kg.

In both investigations, samples were analyzed using Method 9010, which measures the *total* cyanide content by converting soluble cyanide salts and many insoluble cyanide complexes to hydrocyanic acid. Since this method does not provide data for individual cyanide species, the data cannot be used in a formal health risk assessment. In hazardous waste site investigations, analytical methods like 9010 that quantify the aggregate concentration of compounds in a specific chemical class are generally used to identify areas of concern, i.e., areas that warrant additional investigation using more specific analytical methods. However, if interpreted using very conservative assumptions, data from Method 9010 can be used to “screen out” cyanide compounds from further consideration in a health risk assessment. This approach is described below.

The potential health risks associated with cyanide in soil were evaluated by comparison to PRGs. (See the June 2000 Response to Comments on the Draft Field Sample Plan and the January 2001 Data Summary Report prepared by URS.) As noted earlier, chemical-by-chemical comparison of site-derived data with PRGs is not consistent with standard health risk assessment methodology. Apparently, the maximum aggregate concentration of all the cyanide compounds detected in a single sample was compared to the PRG for “free” cyanide (currently 1,200 mg/kg).

According to Shifrin *et al.* (1996), the most prevalent types of cyanide compounds found at former MGP sites are relatively nontoxic iron-complexed forms such as ferric ferrocyanide (also known as Prussian blue). For this reason, comparison of the maximum concentration of total cyanide detected in any one sample to the PRG for free cyanide probably constitutes a very conservative, screening-level method for assessing potential health risk. The comparison (the maximum detected concentration of total cyanides was 41 mg/kg vs. a PRG of 1,200 mg/kg for free cyanide) suggests that exposure to cyanide compounds in soil would not adversely affect the health of Midway Village residents.

Phenolic Compounds

According to a 1987 report prepared for the Gas Research Institute (GRI), phenol, 2-methylphenol, 4-methylphenol, and 2,4-dimethylphenol are frequently detected at MGP sites. During the 1992-93 Remedial Investigation, phenolic compounds were detected in approximately half of the 70 surface soil samples collected from Midway Village at concentrations ranging from 0.5 to 31 mg/kg. They were detected in just 3 of 17 background samples, and the maximum background concentration was 0.7 mg/kg. These results reflect analysis for *total* phenols by Method 9065,⁷ which does not discriminate between different phenolic compounds. For this reason, analytical data generated during this study are not appropriate for estimating human health risks.

⁷ Spectrophotometric analysis by reaction with 4-aminoantipyrine in the presence of potassium ferricyanide at pH 10.

During the June 2000 investigation, 184 surface soil samples were analyzed for individual phenolic compounds using Method 8270C. Phenols were detected in just two of 184 surface soil samples, and the maximum detected concentration was 0.26 mg/kg.

The residential soil PRGs for the four phenolic compounds commonly detected at former MGP sites range from 310 mg/kg (4-methylphenol) to 18,000 mg/kg (phenol). As a screening level assessment of potential human health risks, the highest detected concentration of total phenolic compounds detected during the two site investigations can be compared with the lowest PRG of the four phenolic contaminants. This comparison (31 mg/kg detected in a soil sample collected during the 1992-93 investigation vs. a residential soil PRG of 310 mg/kg for 4-methylphenol), together with the very low detection frequency reported in the June 2000 investigation, indicate that phenolic compounds in soil are not likely to represent significant health risks at this property. The validity of this conclusion relies in part on the assumption that 4-methylphenol is indeed the most toxic phenolic contaminant in soil at Midway Village.

In summary, based on screening level health evaluations that relied on “worst case” (health conservative) assumptions, cyanide and phenolic compounds in soil do not appear to represent a health risk to the residents.

Volatile Organic Compounds (VOCs)

As noted in the 1987 GRI report, “...the primary volatile organics anticipated at MGP site are benzene, toluene, xylene and ethylbenzene...It should be noted that while these monocyclic aromatics are often present, it is not anticipated that significant concentrations of their chlorinated or nitrogenated derivatives will be [present] unless operations other than the manufacture of gas occurred on the site.”

Although low levels of various petroleum-derived and chlorinated VOCs were detected infrequently in early investigations of soil and groundwater, the 1993 PHEE did not include an evaluation of VOCs as COPCs. (See also data from Appendix A of the September 1993 Remedial Design Implementation Plan, prepared shortly after the PHEE was released.) This may be regarded as an oversight, but is not entirely unexpected given the prevalence of relatively high concentrations of PAHs that had been identified in soil and the clear implication that PAHs would be primary “risk drivers” for this property. Furthermore, in the early to mid-1990s, the principal concern regarding VOCs was their capacity to move downward through soil and contaminate groundwater. If this occurred, exposure via ingestion of contaminated groundwater would represent a potentially complete exposure pathway. However, groundwater beneath Midway Village was not a source of drinking water, and it was concluded that ingestion of contaminated groundwater would not occur.

Furthermore, it was assumed that the only potential source of VOCs was the contaminated soil that was removed from the former MGP and used for grading the land that Midway Village now occupies. It would be reasonable to presume that any VOCs present in soil would evaporate during the excavation and grading activities, but this assumption may not be correct because VOCs can partition into organic wastes like MGP

residues and their evaporation rate may be slowed down significantly (Hawthorne and Miller, 2003).

It is now recognized that VOCs in soil are an environmental concern not only because of their potential to migrate downward and contaminate groundwater, but also because of their potential to move upward through soil and contaminate the air inside residences and buildings. Therefore, if VOCs were present in soil, inhalation of contaminated indoor air could constitute a complete exposure pathway.

Another consideration is the techniques used to collect soil and groundwater samples in the 1980s and 1990s did not take sufficient precautions to prevent evaporative loss of VOCs. This results in underestimation of VOC concentrations and the sampling techniques would not be considered acceptable by today's standards.

Taken together, these considerations indicate that additional investigation of the potential presence of VOCs in soil and groundwater beneath Midway Village is warranted. OEHHA recommends that a soil gas investigation should be conducted and the data should be analyzed to assess the significance of exposure to VOCs in indoor air. As discussed below, the 2002 indoor air study tested for the presence of volatile PAHs in indoor air but did not evaluate all potential VOC contaminants. Therefore, if a soil gas investigation is conducted, target analytes should include the complete suite of VOCs as well as volatile PAHs.

Polychlorinated Biphenyls (PCBs)

The Midway Village/Bayshore complex is located immediately adjacent to a PG&E Service Center. Historically, such facilities were used for storage of transformers containing PCBs, and leakage PCB transformer fluid and consequent soil contamination were not uncommon. Grading activities occasionally caused the contaminated soil to be spread to adjacent properties. Nevertheless, we believe PCBs are not likely to represent a significant human health risk at Midway Village for the following reasons:

- Site History: While the descriptions of site history are unclear in this regard, it appears that the U.S. Navy and the San Mateo County Housing Authority maintained control of the property immediately north of the Midway Village complex from 1944 through 1979. In 1979, PG&E reacquired control of this property (Ecology and Environment; July, 1993). The heyday of PCB use began during World War II and lasted through the mid-1970s. PCBs were banned from commerce in 1976 with the passage of the Toxic Substances Control Act.
- Risk Screening Using Available Data: As noted in the discussion of site history, 47 µg/kg PCBs as Arochlor 1254 were detected in one of five soil samples analyzed during the 2001-02 removal action. This concentration is well below the U.S. EPA Region 9 Preliminary Remediation Goal for "PCBs (unspeciated mixture, high risk, e.g., Arochlor 1254)" of 220 µg/kg. The PRG was calculated using an exposure scenario that assumes direct exposure to PCBs in soil for 30 years.

- Low Frequency of Detection: Unfortunately, the data available for PCBs are very limited. The 426 samples collected during the June 2000 investigation were analyzed by U.S. EPA Method 8270, which is capable of detecting PCBs, but PCBs were not target analytes in this study. PCBs were detected in one of five soil samples collected during the 2001-02 removal action but the concentration was very low. These data suggest that PCBs may be present at very low concentrations in Midway Village soil. However, the data are not compelling.
- Effectiveness of Remedial Action: Like PAHs, PCBs are generally immobile in soil and non-volatile. Backfill soil that was used to replace soil excavated during the 2001-02 removal action was analyzed for PCBs and none were detected (ERRG, 2002).⁸ Therefore, even if PCBs were present in unremediated subsurface soil, exposure would be prevented by two feet or more of clean fill.

Naphthalene

Naphthalene, a simple two-ring PAH compound, is one of five PAH compounds that is volatile at ambient temperature.⁹ Until recently, it was not considered to be carcinogenic. In 2000, however, a National Toxicology Program bioassay of naphthalene in rodents provided clear evidence that the compound is carcinogenic, and in April 2002 it was identified as a carcinogen by the State of California under the Safe Drinking Water and Toxics Enforcement Act (Proposition 65).¹⁰ A unit risk value for naphthalene was established in August 2004.

Because naphthalene is volatile, exposure to this compound may not be completely mitigated by the remedial actions that have been carried out at Midway Village thus far. Volatile contaminants in soil have the capacity to move upward through the soil column to the ground surface. Therefore, if residential housing is situated on VOC-contaminated property, contaminants may enter indoor air via this pathway. Depending on the nature and toxicity of the contaminants, this pathway could represent a significant health risk to occupants of the residences.

Although U.S. EPA has developed a computer model for estimating the concentrations of volatile contaminants in indoor air based on the concentration in soil or soil gas,¹¹ a more direct approach to evaluating the significance of this pathway is to determine the indoor air concentration experimentally. This is the approach that DTSC undertook in conducting the indoor air study described in the summary of site history [Indoor Environmental Engineering (“IEE”), 2002]. In this study, PAH concentrations in indoor air were determined in two areas of the complex: buildings situated above known sources of contamination in the northern portion of the complex, and buildings situated in areas where little or no contamination is believed to be present. In all, five residences,

⁸ Table B-3. The detection limit was 50 µg/kg.

⁹ The other four “volatile” PAHs – acenaphthene, anthracene, fluorene and pyrene – are not carcinogenic. They are also much less volatile (i.e., have a lower vapor pressure) than naphthalene.

¹⁰ http://www.oehha.ca.gov/prop65/out_of_date/41902notice.html

¹¹ http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm

two schools (Bayshore Elementary and Robertson Intermediate), the Bayshore Child Care Center and the offices of the Midway Village Homeowners Association were tested.

In an email message to Karen Toth dated 19 August 2005, Dr. Kimi Klein (DTSC Staff Toxicologist) evaluated the health risks associated with the concentrations of naphthalene that were detected in indoor air at Midway Village residences. Dr. Klein noted that indoor concentrations of naphthalene detected in three locations over areas of contamination did not appear to be significantly different from concentrations detected in three locations in uncontaminated areas (i.e., 68-116 ng naphthalene/m³ detected in contaminated areas vs. 62-108 ng/m³ in uncontaminated areas). The highest concentration, 151 ng/m³, was detected in the Midway Village Housing Office. Comparing these concentrations with the California Human Health Screening Level (CHHSL)¹² for naphthalene (72 ng/m³), the cancer risks associated with these concentrations of naphthalene in indoor air were 0.9 to 2.1 x 10⁻⁶, assuming a residential exposure scenario. These risk estimates were for naphthalene only and did not consider the cumulative risks associated with concurrent exposure to multiple PAH contaminants in indoor air. Dr. Klein also noted that the method for collecting air samples (adsorption onto XAD resin and polyurethane foam) had an efficiency of approximately 65 percent.¹³ Nevertheless, since the health risks associated with naphthalene in indoor air were very low compared to the risks associated with exposure to PAHs in soil, correcting for sampling inefficiency in the indoor air study would not appreciably alter the total health risk estimate for the residents.

The concentrations of many of the PAHs detected in indoor air were generally higher than those detected in ambient (outdoor) air, suggesting they may originate from one or more indoor sources.¹⁴ Overall, however, the PAH concentrations detected in this study were much lower than the concentrations reported in two large studies sponsored by the California Air Resources Board in 1992-3.¹⁵ Indoor sources of PAHs include combustion devices such as natural gas-fired forced air heaters and hot water heaters. In DTSC's 2002 study, the forced-air furnaces inside all buildings except Robertson Intermediate School were operating during the sampling period.¹⁶ In addition to being a potential indoor source of PAH emissions, an operating furnace produces a "stack effect," creating relative negative air pressure indoors and drawing contaminants in from outside, including VOCs present in soil beneath the structure.¹⁷ Since the two potential sources for PAH emissions (gas-fired heating devices and contaminated subsurface soil) were not

¹² <http://www.oehha.ca.gov/risk/pdf/screenreport010405.pdf>. CHHSLs for carcinogens are concentrations that would result in a cancer risk of 10⁻⁶, assuming a 30-year residential exposure scenario.

¹³ Dr. Klein cited Air Toxics Limited as the source for the estimated sampling efficiency.

¹⁴ "Indoor Environmental Inspection Report for the Midway Village Located in Daly City, CA" (prepared Indoor Environmental Engineering, September 4, 2002), page 5.

¹⁵ <http://www.arb.ca.gov/research/apr/past/indoor.htm>

¹⁶ "Indoor Environmental Inspection Report for the Midway Village Located in Daly City, CA" (prepared Indoor Environmental Engineering, September 4, 2002), page 1. The report noted that Robertson Intermediate School did not have a gas fired furnace or any other potential indoor sources of PAHs.

¹⁷ "Interim Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion into Indoor Air" (California EPA, Department of Toxic Substances Control, 2005), page 32.

evaluated directly,¹⁸ conclusions regarding their relative significance cannot be made based on the available data.

As noted above, the study evaluated indoor air in residences, schools, a daycare center and an office building. The ventilation systems in schools and other public buildings typically differ from the systems used in residential housing. Most schools as well as public and commercial buildings have mechanical ventilation systems that actively bring in outdoor air when heating or cooling in order to meet requirements for sufficient outdoor air exchange. As a result, turning on the heating system in most schools would actively bring in outdoor air and thereby dilute the concentration of indoor pollutant(s). For this reason, in most schools and public/commercial buildings, a “worst case” condition for monitoring contaminants in indoor air would likely be achieved with the heating and ventilation system turned off.

In the 2002 indoor air study, the gas fired furnaces at Bayshore Elementary School, Bayshore Child Care Services and the office of the Midway Village Homeowners Association were operating during the sampling period. Unless these three buildings are older construction with wall furnaces that lack outdoor air intakes, operating the heaters during the testing period may have diluted the concentrations of PAHs in indoor air. Therefore, it may be appropriate to conclude that these three samples were collected under “realistic” rather than “worst case” conditions. On the other hand, it appears that the five residential samples were collected under “worst case” conditions that favor influx and accumulation of subsurface contaminants.

Assessment of Potential Human Health Risks

The 1993 Public Health and Environmental Evaluation (“PHEE”) and Related Correspondence

An assessment of potential human health risks associated with exposure to MGP-derived contaminants in soil was presented in the *Final Public Health and Environmental Evaluation of the Midway-Bayshore Project* (Ecology and Environment, 1993). Based on the numerous documents, reports and correspondence that OEHHA reviewed, the PHEE appears to be the only health risk assessment that was ever completed for Midway Village. The procedures used in the PHEE appear to be generally consistent with the standard deterministic approach in use at the time it was prepared. While several conservative assumptions were incorporated into the assessment, producing risk estimates that were higher than otherwise would have been calculated, a number of deficiencies were also noted.¹⁹ A detailed critique of the PHEE is beyond the scope of this review. Furthermore, numerous changes in the practice of human health risk assessment have occurred since 1993. Among the more significant changes are

¹⁸ For example, measurement of volatile PAHs in soil gas would constitute a direct examination of contaminated soil as a source of emissions to indoor air.

¹⁹ OEHHA did not receive any documents suggesting that the health risk assessment presented in the PHEE was reviewed by a DTSC toxicologist, or that it had a significant impact on subsequent risk management decisions.

- Adoption of Potency Equivalency Factors that account for differences in the potency of carcinogenic PAHs
- Identification of naphthalene as a probable human carcinogen
- Recognition that vapor intrusion of volatile contaminants from soil to indoor air represents a complete exposure pathway, and development of the Johnson and Ettinger model to estimate the magnitude of exposure

Given the deficiencies in the original evaluation and evolution of accepted risk assessment methodology, we believe the 1993 PHEE should no longer be regarded as a valid appraisal of potential human health risks.

Cancer Risk Associated with the Final Target Remediation Goal for PAHs in Soil [0.9 mg/kg B(a)P_{eq}]

At about the same time the PHEE was being finalized, DTSC received correspondence from Patrick Ritter, project manager from the consulting firm Ecology and Environment, proposing adoption of a 10 parts per million cleanup goal for total PAHs. (See letters dated June 11 and June 25, 1993.) Although risk-based calculations were utilized to support this value, the calculations would not be regarded today as consistent with standard risk assessment methods.

The final target remediation goal for the 2001-02 removal action was based primarily on the average background level of PAHs detected in soil from areas surrounding Midway Village. (As a risk management decision, the validity of “cleaning up to background” is discussed below.) The cancer risk associated with the target remediation goal can be estimated using relatively simple calculations.

The final target cleanup goal for PAHs in surface soil was 0.9 mg/kg B(a)P_{eq}. The U.S. EPA Region 9 Preliminary Remediation Goal (PRG) for B(a)P in residential soil is 6.2×10^{-2} mg/kg (0.062 mg/kg), which is equivalent to a residual cancer risk level of 10^{-6} (one in a million).²⁰ Therefore, the target cleanup goal of 0.9 mg/kg B(a)P_{eq} equates to a residual cancer risk of 1.5×10^{-5} . This level of risk is near the mid-point of the U.S. EPA’s risk management range of 10^{-6} to 10^{-4} for hazardous waste sites. The additional risk associated with exposure to the maximum concentration of naphthalene in indoor air (discussed above) increases the total risk to approximately 1.7×10^{-5} , which is also well within the U.S. EPA’s risk management range.

Several post-remediation samples collected during the 2001-02 removal action had B(a)P_{eq} concentrations that were significantly below the target remediation goal. For example, post-excavation samples collected in shallow soil near Building 22 ranged from 0.006 to 0.013 mg/kg B(a)P_{eq}. The risk associated with exposure to soil containing 0.013 mg/kg B(a)P_{eq} is approximately 5×10^{-7} . Conversely, other confirmation samples had B(a)P_{eq} concentrations that were significantly above the target remediation goal. For example, two post-excavation samples collected between Buildings 31 and 32 had 2.2

²⁰ The exposure pathways included in the PRG calculation are inadvertent ingestion of soil, inhalation of airborne soil particulates, and dermal contact with soil and subsequent transdermal absorption. In areas of Midway Village where surface soil has not been remediated, all of these pathways are complete.

and 13.1 mg/kg B(a)P_{eq}. However, since the latter samples were collected at depths of three to five feet bgs and minimal opportunity for exposure exists, any potential cancer risk has been mitigated.

Comment on Bioavailability of PAHs and VOCs from MGP Sites

Research conducted over the past fifteen years suggests that PAHs in residues from former MGP plants are not bioavailable, that is, they are not readily absorbed following ingestion, inhalation or dermal contact. Recent studies (Hawthorne and Miller, 2003; Stroo et al., 2005; Hong et al., 2003) continue to support this conclusion. PAH bioavailability is a potentially significant issue because human health risk assessments and target remediation goals generally assume 100 percent bioavailability. This is a default assumption in most MGP risk assessments because PAH bioavailability is thought to vary with site-specific conditions. Therefore, the results of PAH bioavailability studies of soil samples collected from one MGP plant are not necessarily applicable to those collected from another.

If the bioavailability of PAHs at Midway Village is less than 100 percent, then an additional degree of conservatism has been incorporated into the remedial actions taken there. For example, if 50 percent bioavailability were assumed, then the cancer risk associated with the target remediation level of 0.9 mg/kg B(a)P_{eq} would be approximately 9×10^{-6} . This level of risk is approximately the mid-point of the U.S. EPA's target risk management range of 10^{-6} to 10^{-4} .

Assessment of Potential Non-Cancer Health Effects

During the October 25, 2005 meeting of the Cal/EPA Interagency Working Group on Environmental Justice, some members expressed concern that the evaluation of potential adverse health effects at Midway Village was focused exclusively on cancer, and that possible non-cancer effects (such as skin sensitization) had not been considered. This is a valid concern, as prolonged exposure to PAHs is known to cause a number of harmful effects (ATSDR, 1995 and 2003). OEHHHA has identified 15 PAHs as probable human carcinogens, and all are capable of producing non-cancer toxicity. However, the exposure standards for carcinogenic chemicals are – almost without exception – substantially lower than the standards for exposure to non-carcinogens. For this reason, exposure standards that account for carcinogenicity are more than adequate to prevent the occurrence of adverse non-cancer effects.

Two types of toxicity factors are used in human health risk assessments. One factor is called a *cancer slope factor* (CSF), and it provides a quantitative measure of the strength (potency) of a chemical to cause cancer. While the process used to derive CSF values is too complex to review in this report, it is important to recognize that it is highly conservative (health-protective). Carcinogens are regulated much more stringently than non-carcinogens. The larger the CSF, the *more* potent a carcinogen is. For example, the CSF values for two PAHs, benzo(a)pyrene and naphthalene, are 12 and 0.12 mg/kg-day⁻¹ respectively. This means that benzo(a)pyrene is 100 times more potent a carcinogen than naphthalene.

The other type of toxicity factor provides a quantitative measure of the strength of a chemical to produce toxic (non-cancer) effects. In human health risk assessments, the toxicity factor used to characterize non-cancer toxicity is called a *reference dose* (RfD). A *chronic* RfD is defined by the U.S. EPA as

...an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime.

RfDs are generally based on the results of animal toxicity studies that identify daily doses with minimal or no adverse effects on the health of the animals. The minimal- or no-effect level is then divided by a one or more safety factors to account for the possibility that humans may be more sensitive to the chemical or exposed for a longer period of time. Aggregate safety factors are typically 100-1000, meaning that RfDs are generally 100-1000 times lower than the doses that failed to produce evidence of toxicity in animals. The larger the RfD, the *less* toxic a chemical is. RfDs are used as benchmarks to determine whether exposure to a given chemical is likely to cause non-cancer adverse health effects. Daily exposures that are below the RfD are presumed to be non-toxic.

Since carcinogens are regulated more stringently than non-carcinogens, few carcinogens have both a CSF and an RfD. A notable exception is naphthalene, a simple two-ring PAH that was recently classified by the State of California under Proposition 65 as a chemical known to the state to cause cancer based on the results of recent animal cancer bioassays. As a result, OEHHA has developed a CSF for naphthalene. The U.S. EPA still regulates naphthalene as a non-carcinogen and continues to use an RfD to evaluate exposure and assess the potential for non-cancer toxicity.

Naphthalene is the only COPC at Midway Village that has both a CSF and an RfD. For this reason it represents a unique example of the additional conservatism introduced when a chemical is identified as a carcinogen. Recognizing that Cal/EPA has identified naphthalene as a carcinogen while U.S. EPA has not, the Region 9 office of U.S. EPA has developed PRGs for naphthalene in residential soil under the alternative assumptions that the chemical is either a carcinogen or a non-carcinogen. Assuming that naphthalene is not a carcinogen and utilizing the RfD developed by U.S. EPA, the PRG for residential soil is 56 mg/kg. Assuming that it is carcinogenic and utilizing the CSF developed by OEHHA, the PRG for residential soil is 1.7 mg/kg. Therefore, once naphthalene was identified as a carcinogen, the PRG declined by 97 percent.²¹ [As noted earlier in this report, the cancer risk associated with exposure to naphthalene in indoor air was evaluated by Dr. Kimi Klein (DTSC Staff Toxicologist) and appears to be no greater than 2×10^{-6} .]

²¹ Until recently, a similar situation existed for arsenic. The residential soil PRG based on non-cancer effects was 22 mg/kg while the PRG based on carcinogenic effects was 0.6 mg/kg. The non-cancer PRG for arsenic was withdrawn in 2004.

In a June 25, 1993 letter, Patrick Ritter of Ecology and Environment evaluated the potential for non-cancer toxicity (specifically, skin hypersensitivity) using a margin-of-exposure approach. This was a simple comparison of the dermal exposure estimated to result from a given PAH residual level in soil (in this case, 10 ppm total PAHs) with the dose required to elicit a hypersensitivity reaction in animals. The estimated dermal exposure was 700 times less than the lowest no adverse effect level (NOAEL) for skin hypersensitivity reported in the toxicology literature. This approach was not nearly as conservative as the one used in current health risk assessments because a NOAEL from an animal study (rather than an RfD) was used as an estimate of the toxicity threshold in humans. Therefore, no safety factors were used to account for the possibility that humans may be more sensitive than animals to PAH-induced skin hypersensitivity. By current risk assessment standards, Mr. Ritter's analysis would not be regarded as a valid appraisal of potential adverse non-cancer health effects. However, there was no further evaluation of potential non-cancer health hazards in any of the documentation that OEHHA reviewed.

This example illustrates the principle that target remedial goals based on the carcinogenic properties of contaminants are generally more than sufficient to prevent the occurrence of non-cancer adverse health effects.

Justification for Risk Management Decisions

Overall Strategy for Remediating Non-volatile PAHs

As noted above, the risk management approach was to remove two to five feet of accessible contaminated soil with $B(a)P_{eq} > 0.9$ mg/kg and replace it with clean soil. Therefore, clean fill was used to replace existing soil only in those areas where the detected $B(a)P_{eq}$ concentration exceeded 0.9 mg/kg. This strategy ensured that exposure to soil with a $B(a)P_{eq}$ concentration in excess of 0.9 mg/kg would be unlikely to occur, thereby managing potential risks to human health. Post-remediation sampling data clearly show that soil with PAH concentrations in excess of the target cleanup goal was left in place beneath the excavated and filled areas. In addition, there is little doubt that PAH-contaminated soil is still present beneath the residences even though soil beneath these buildings was never tested. Nevertheless, the opportunity for direct exposure to PAHs in soil at levels greater than 0.9 mg/kg $B(a)P_{eq}$ has been largely eliminated, and as a consequence the risks to human health have been minimized.

Opportunities for occasional short-term exposure may still exist. For example, a resident or contractor who is unaware of subsurface soil contamination may for various reasons begin digging in one of the open or landscaped areas of the complex and bring contaminated soil up to the surface. Short-term exposure to a relatively small volume of soil having a PAH content above the 0.9 mg/kg $B(a)P_{eq}$ remediation goal would not be expected to cause adverse non-cancer health effects. Furthermore, institutional controls over excavation activities at Midway Village provide assurance that the duration and magnitude of exposure will be limited.²² In addition, DTSC conducts five-year reviews

²² A deed restriction on land use at the Midway Village complex was recorded in September 1998. A copy of the original deed restriction is available at

of all sites with ongoing operation and maintenance requirements. As part of these reviews, inspections are conducted to verify the integrity of all paved areas, thereby ensuring that exposure via direct contact with contaminated soil is unlikely to occur. The last five-year review report for Midway Village was completed on June 19, 2002, and the next five-year review is scheduled for 2007.²³

Adoption of the Background Concentration as a Target Remediation Goal for Carcinogenic PAHs

According to U.S. EPA (1989), “background” concentrations of chemical contaminants are (1) levels present in native soil that are not influenced by human activities (i.e., they are “naturally occurring levels”), or (2) chemicals that are present due to anthropogenic sources *not* related to activities at the site under investigation, but have been caused by general human activity and found throughout the environment. Background chemicals can be either localized or ubiquitous. For example, California soils are naturally high in arsenic; levels typically range from 5-10 mg/kg in most parts of the state.²⁴

Background residues of PAHs in soil are generated primarily by anthropogenic sources: they result from deposition of airborne particles that are produced by combustion of organic compounds. The burning of petroleum fuel in motor vehicles and combustion of wood in household fireplaces are two primary sources of PAHs in urban areas.

The target remedial goal for surface soil adopted for the 2001-02 removal action was based on a data set of background samples collected for a number of hazardous waste site investigations. OEHHA did not review the justification for 0.9 mg/kg B(a)P_{eq} as a representative background concentration. However, we were informed that DTSC toxicologists had reviewed the data and supported this conclusion.

As discussed elsewhere in this report, the target remedial goal for PAHs equates to a cancer risk of $1-2 \times 10^{-5}$. To achieve a 10^{-6} cancer risk, the remedial goal would need to have been one-tenth to one-twentieth the background concentration of carcinogenic PAHs, which would have been inconsistent with U.S. EPA risk management decisions at other sites. As stated by U.S. EPA (2004),

Generally EPA does not clean up below natural background. In some cases, the predictive risk-based models generate PRG concentrations that lie within or even below typical background concentrations for the same element or compound. If natural background concentrations are higher than the risk-based PRG concentrations, then background concentrations should also be considered in determining whether further evaluation and/or remediation is necessary at a particular site.

http://envirostordev.ecointeractive.com/regulators/deliverable_documents/1977475821/SMBR%5FDEED%5F41650007%2Epdf

²³ Additional information is available at DTSC’s Envirostore database at

<http://www.envirostor.dtsc.ca.gov/public/>

²⁴ Note that there is no evidence that arsenic is a chemical of potential concern at Midway Village.

Therefore, establishing a target remediation level that is equivalent to the background concentration of a contaminant is clearly in line with federal risk management guidance.

Conclusions

Based on the reports and other information reviewed, we conclude the following:

- The distribution of PAH contaminants in accessible surface soil at Midway Village and Bayshore Park was adequately characterized for the purpose of making informed risk management decisions. Over a 15 year period, more than 800 surface and shallow sub-surface samples were collected and analyzed.
- The lateral and vertical extent of PAH contamination in subsurface soil was not completely characterized, but potential for exposure to these contaminants appears to have been substantially reduced or eliminated by the remedial actions that were taken.
- Other classes of contaminants (PCBs, phenolic compounds and cyanide compounds) may be present in subsurface soil. However, the available data suggest that these contaminants are either (a) present at concentrations that do not represent a significant human health risk, or (b) not mobile and not present in surface soil, so exposure via direct contact with contaminated soil is not likely to occur.
- Upward migration of VOCs (if present) and volatile PAHs, and subsequent inhalation in indoor air represents a potentially complete exposure pathway. The results of the 2002 study suggest that PAHs in indoor air do not represent a significant health risk. However, this study did not evaluate indoor levels of chlorinated and non-chlorinated VOCs.
- To address data gaps in the characterization of VOCs in subsurface soil, OEHHA recommends that a soil gas investigation be conducted. Target analytes should include volatile PAHs and the full suite of chlorinated and non-chlorinated VOCs. The data gathered from this study should be evaluated to assess the potential health significance of exposure to volatile compounds in indoor air.
- If the results of the soil gas investigation indicate that indoor exposures may be significant, then a follow-up investigation of indoor air may be warranted.
- The cancer risk associated with a target remediation goal of 0.9 mg/kg B(a)P_{eq} in surface soil is conservatively estimated to be 1-2 x 10⁻⁵. In some areas, where post-remediation sampling indicated PAH concentrations that were lower than the target remediation goal, the cancer risks are proportionally lower.
- The target remediation goal is sufficiently low that adverse non-cancer health effects (e.g., skin sensitization) due to PAH exposure are not expected.
- The risk management decisions and remedial actions taken at Midway Village appear to be consistent with relevant federal risk management guidelines.

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**Appendix A:
Midway Village Site History
(ERRG, 2002)**

2. SITE HISTORY AND CONDITIONS

The Midway Village Housing complex is comprised of 35 multi-family townhouse-type buildings owned and operated by the SMCHA. Nine of these buildings were near to excavation areas (Buildings 22, 23, 24, 28, 29, 32, 33, 34, and 35) as shown on Figure 1-2. The adjacent Bayshore Park is a 3.8-acre park owned and operated by the City of Daly City. The park consists primarily of an open lawn area as well as a baseball field backstop and bleachers, basketball court, and playground area. The following sections describe the history of the Project Site and current site conditions.

2.1. Site Description and Background

Previous investigations of the site indicate that from 1905 to 1916 an oil gas manufacturing plant occupied the western portion of the adjacent PG&E site to the north. Gas produced by the plant was utilized by residences, commercial businesses, and to power electricity generators. During the production of the gas, oil was heated to separate the lighter gas components from heavier components. By-products of the process include residues comprised of tars, powdered carbon and lampblack, which contain PAHs. In 1944, through eminent domain proceedings, the federal government took control of property to the south of the plant and a portion of the property containing the former plant in order to provide military housing. During construction of the military housing the grading operations shifted PAH-contaminated soil into low-lying areas of the proposed housing complex. The housing complex was eventually turned over to the San Mateo County Housing Authority (SMCHA) in 1955. From 1975 to 1977, the SMCHA demolished the original housing complex and constructed new housing to the south (the current location of Midway Village). Daly City received the title to the property that is now Bayshore Park in 1977 and PG&E regained control of the remaining property in 1979.

2.2. Previous Site Investigations

PG&E conducted several environmental investigations in the area adjacent to the former location of the oil gas manufacturing plant, the current location of the Martin Service Center. Results of these investigations, which were conducted in 1982, 1987, and 1988, were submitted to the DTSC and the Regional Water Quality Control Board (RWQCB).

In a 1989 investigation, CH2M Hill collected soil samples from the northwest portion of Bayshore Park (adjacent to Buildings 31 and 32), along the eastern and western fence lines, and from the baseball park infield. The depth of soil samples ranged from surface soil samples to 2-feet bgs. Chemical concentrations ranged from 0.004 to 72 milligrams per kilogram (mg/kg) for total PAHs and less than 0.50 to 2.1 mg/kg for cyanide. No

volatile organic compounds (VOCs) were detected in any of the soil samples collected (Daly City, 1998).

In 1990, the DTSC became involved in the project and collected six additional soil samples in August 1990, from areas adjacent to the Daycare Center, the playground at the south end of the park and in the baseball diamond. Analytical results indicated total PAHs were present at concentrations ranging from 0.21 to 1.4 mg/kg (Daly City, 1998). In 1992, five samples were collected in the vicinity of the Daycare Center and two samples were collected around home plate in the baseball diamond. Concentrations around the Daycare Center ranged from below laboratory detection limits to 10 mg/kg and concentration near home plate were 0.11 mg/kg and 0.04 mg/kg (Daly City, 1998).

In September of 1992, Ecology and Environment, Inc. collected 17 surface soil samples and 33 subsurface soil samples from Bayshore Park and analyzed for PAHs, cyanide, and phenols. Analytical results for the surface samples indicate the presence of total PAHs at concentrations ranging from 0.093 mg/kg to 15.34 mg/kg, cyanide ranging from below laboratory detection limits to 41 mg/kg, and phenols from below laboratory detection limits to 19 mg/kg. Subsurface soil samples, collected from 2 to 10 feet bgs, were found to contain PAHs from below laboratory detection limits to 635 mg/kg, cyanide from below laboratory detection limits to 6 mg/kg, and phenols from below laboratory detection limits to 2.3 mg/kg. Nineteen additional samples were collected from off-site locations as background surface soil samples. Total PAH concentrations ranged from less than 0.2 mg/kg to 1.031 mg/kg, cyanide concentrations were below laboratory detection limits, and phenols were detected at concentrations from below laboratory detection limits to 0.67 mg/kg. Groundwater samples collected during the investigation found concentrations of PAHs at 33.5 microgram per liter ($\mu\text{g/L}$), benzene at 2.1 $\mu\text{g/L}$, cyanide at 140 $\mu\text{g/L}$, ammonia at 2.7 $\mu\text{g/L}$, and total petroleum hydrocarbons as diesel at 120 $\mu\text{g/L}$ (Daly City, 1998).

Based on these results, a remedial action plan for Midway Village was prepared and approved in 1993 (Ecology and Environment, 1993) and executed in 1994. The remediation involved excavating impacted soil from areas surrounding the residential units and portions of Bayshore Park, then capping the site with two feet of clean soil, concrete patios asphalt, or walkways. The cleanup level for that remediation phase was established as 10 mg/kg of total PAHs (both carcinogenic and non-carcinogenic compounds).

A Removal Action Workplan (RAW) for soil remediation at Bayshore Park was prepared by the City of Daly City in July 1998. The RAW described the site remediation alternatives associated with the installation of a 96-inch diameter storm drainpipe through the Bayshore Park as well as investigation and remediation activities associated with three areas within the park. The remedial action objectives for this project were (1) removal of soil with concentrations in excess of 10 mg/kg of total PAHs and (2) encapsulation of all subsurface soils exceeding 10 mg/kg total PAHs with a minimum of 2 feet of clean material in conjunction with restricting future disturbances through institutional controls.

Lowney Associates performed a soil evaluation study of Bayshore Park for Daly City in December of 1998. The purpose of the study was to determine the concentrations of contaminants in the soil at the park along a proposed stormdrain pipeline alignment and to further define the extent of contamination in the top 2 feet of Bayshore Park. Samples collected included 76 shallow soil samples (0 to 2 feet bgs) and 24 subsurface samples (2-, 4-, 8-, and 12-foot bgs). Total PAHs, reported as B(a)P equivalents, were detected in shallow soil samples at concentrations ranging from below laboratory detection limits to 17 mg/kg. PAHs were also detected in soil samples collected below 2 feet bgs at concentrations up to 11 mg/kg as B(a)P equivalents (Lowney, 1999). The stormdrain pipeline alignment was excavated to accommodate the pipeline installation and the soil was disposed of off-site in accordance with federal, state, and local regulations.

In June 2000, URS Corporation conducted an additional sampling investigation under contract to the DTSC to determine if residual concentrations of PAHs existed in soils at Midway Village. A total of 426 samples were collected from 150 locations in the housing complex and the southern portion of Bayshore Park and analyzed for PAHs, lead, phenols, and cyanide in the soil. Samples were collected at depths ranging from ground surface to 5 feet bgs. Total PAHs, compared to the screening value of 0.62 mg/kg reported as B(a)P equivalents, were detected in shallow soil samples at concentrations ranging from below laboratory detection limits to 16 mg/kg, and in soil samples collected below 2 feet bgs at concentrations ranging from below laboratory detection limits to 28 mg/kg (URS, 2001a). The lead, phenol, and cyanide data were compared to the EPA Region 9 Preliminary Remediation Goals ([PRGs] EPA, 2000) for residential use. The analytical results for these constituents were all below residential PRGs and therefore, were not identified as chemicals of potential concern.

In May 2001, URS Corporation conducted additional soil sampling to confirm selected sample results from the previous investigation that had B(a)P equivalent concentrations above the screening value of 0.62 mg/kg and to address data quality concerns (URS, 2001b). The data were compared to a revised screening level of 0.9 mg/kg for B(a)P as established by DTSC. Sixty primary samples were collected from 17 locations along with six collocated duplicate samples. Of the 60 samples, nine samples from seven separate locations had B(a)P equivalent concentrations above the screening criteria of 0.9 mg/kg. The concentrations ranged from 1.172 mg/kg to 92.39 mg/kg. Six of the nine samples with concentrations exceeding 0.9 mg/kg were found in surface soils to 0.5 feet bgs. Upon the completion of data validation, none of the results were rejected, and all are usable as qualified data.

2.3. Physical Characteristics

The project site is located at the base of the San Bruno foothills approximately 1 mile west of the San Francisco Bay. The site is relatively flat north of Midway Drive where the remediation activities took place, but steepens to slopes of approximately 25 percent south of Midway Drive. The following sections present the topography and soil characteristics of the remediation areas.

**Appendix B:
Response to Comments
on the
February 2006 Review Draft Report**

Responses to Comments from Review Committee Members

I. Comments from Dr. Stephen M. DiZio, Chief of the Human and Ecological Risk Division, Department of Toxic Substances Control

A. Comments from Dr. DiZio regarding the February 2006 Review Draft:

1. *Samples collected from the baseball diamond in Bayshore Park are not near the Midway Village housing complex.*

This information was provided in the context of a discussion of the history of sampling activities in the Midway Village/Bayshore Park complex. In all likelihood, these data are no longer valid because the samples were collected in 1990, long before the remediation of shallow soil at the park. They did not influence our conclusions regarding the adequacy of characterization of the property occupied by the housing complex.

2. *Statements on pages 6 and 7 of the report that “the lateral and vertical extent of contamination at the site was never completely characterized” and “the site has been adequately characterized for the purpose of making informed risk management decisions” appear to be in conflict.*

There is an important difference between these two statements and we do not believe they conflict. The first statement is correct: contamination beyond 2-5 feet bgs, beneath the residential foundations and beneath existing pavement was not characterized because soil samples from these areas were never collected. However, the overarching risk management goal was to prevent exposure to soil-borne contaminants. Soil beneath pavement and residential foundations is not accessible for direct exposure by residents. Therefore, *within the context of the overall risk management strategy*, we believe that a sufficient number of samples was collected and analyzed to identify those areas of uncovered shallow soil that exceeded the target cleanup goal and that residents potentially could have contacted directly.

3. *Although the overall cleanup goal for shallow soil was 0.9 mg/kg B(a)P_{eq}, much lower residual concentrations were achieved in a number of locations during the 2001-02 removal action. A statement to this effect should be noted in the report.* A statement that the residual levels of carcinogenic PAHs in shallow soil were significantly – and occasionally substantially – less than the target cleanup level has been added to the report. Consequently, the cancer risk associated with exposure to these soils is proportionately less than the estimated residual risk level.

B. Comments from Dr. DiZio regarding the oral presentation and slides from the February 15 Review Committee meeting:

4. *Regarding the site history, DTSC has no documentation suggesting that commercial/industrial activities utilizing hazardous substances occurred on the*

property currently occupied by the Midway Village housing complex between cessation of operations at the manufactured gas plant (MGP) in 1915 and the construction of Navy housing in 1944. Transcripts from the federal government condemnation process and a 1986 Preliminary Endangerment Assessment for PG&E's Martin Service Center should be consulted for additional information on this subject. [Neither of these documents was reviewed prior to preparation of the February 2006 Review Draft report.]

We agree with the statement that there is no documentation suggesting that commercial/industrial activities occurred on the Midway Village property between 1915 and 1944. Nevertheless, we believe that the real issue is the lack of historical information for the property and adjoining properties during this 29-year period. For nearly three decades, this property was a seasonal wetland adjacent to a former manufactured gas plant. It may have been an attractive location for what today is termed illegal disposal, although there is no evidence that this actually occurred. Therefore, it would be reasonable to base sampling on a more inclusive panel of target analytes.

5. *Hundreds of samples were collected from all accessible areas within the Midway Village Complex and analyzed for PAHs. Samples were not collected from beneath existing hardscape, and the extent of PAH contamination at depths greater than 2-5 feet bgs was not characterized. It reasonable to assume that PAH concentrations in soil beneath the foundations are similar to those detected in samples collected from more accessible areas.*

It is clear that technical feasibility or lack thereof influenced the selection of sampling locations. Within the context of the risk management decision to protect human health by preventing exposure to soil-borne contaminants, the decision not to sample beneath foundations and hardscape appears to be appropriate. The statement that PAH concentrations beneath these structures are likely comparable to those detected in accessible areas is probably correct, but this is an inference; there are no data to directly support this conclusion. The fact remains that the complete vertical and lateral extent of PAH contamination has not been completely characterized.

6. *If VOCs had originally been present in the soil that was used for grading this property, they probably would have been released [i.e., they would have evaporated] during these operations. Evidence should be provided supporting the need for a soil gas investigation.*

This is a reasonable assumption based on the physical properties of VOCs. However, VOCs can partition into organic wastes like MGP residues, and in doing so their evaporation rate may be retarded. Therefore they may not have been released quickly and may still be present. As noted previously, there are no data to directly support the conclusion that VOCs are not present in soil. In fact, the minimal VOC data that are available suggest that they are. (See page 10 of the Review Draft and page 4 of Dr. DiZio's letter.) Note that the methods used to collect soil samples for VOC analysis in the 1980's and 1990's would not be considered acceptable by today's standards because the minimal precautions were

taken to prevent evaporative loss. Therefore the concentrations detected during the early investigations of this property should be regarded as low estimates of the actual concentrations.

7. *DTSC considered slant drilling to collect samples beneath the homes but concluded that the process would be technically difficult and potentially unsafe due to the presence of underground electrical and gas lines.*

Technical feasibility and safety issues often influence decisions regarding sampling locations. Nevertheless, the lack of information about the nature and extent of contamination beneath the residences constitutes a data gap that should be interpreted using conservative assumptions. For example, it would be prudent to assume that contaminant levels beneath the residences are at least as high as the highest concentrations detected in any of the samples collected from accessible areas. While data gaps such as this one must be interpreted in light of conservative assumptions, actual exposure to non-volatile contaminants located beneath the residences is not expected to occur.

8. *The suggestion that a retrospective assessment of cancer risks and non-cancer hazards should be conducted is vague and lacks details regarding methodology and intended purpose.*

OEHHA did not make this suggestion. A retrospective assessment was one of the bullets on a slide titled “*Possible Follow-up Actions*” (italics added) and was intended to be a discussion topic for members of the Review Committee. It had already been raised as a possible action during an earlier discussion among committee members. The purpose of such an assessment would be twofold: (1) identify the degree of risk reduction achieved by remedial actions taken at the complex, and (2) determine whether past exposures were potentially sufficient to cause adverse non-cancer health effects in the residents. The Review Committee may ultimately determine that a retrospective assessment of potential health risks would be of benefit to the residents of Midway Village. However, providing specific details about the conduct of such a study is beyond the scope of OEHHA’s review.

9. *In the slide summarizing possible follow-up actions, OEHHA suggested that a baseline health assessment of Midway Village residents be conducted. However, ATSDR (the Agency for Toxic Substances and Disease Registry) has already conducted three health consultations addressing (1) the precautions taking during construction and remediation activities, (2) the adequacy of site characterization, and (3) the interpretation of DNA testing data. OEHHA should provide details on how a baseline health study should be conducted.*

OEHHA did not recommend that a baseline health assessment of the residents be conducted, only that members of the Review Committee consider it for discussion. During the course of these discussions, it was clear that some Review Committee members believe that a baseline health assessment is warranted. (See comments from Wilma Subra, below.) The Review Committee can only make

recommendations; it has neither the authority nor the resources to conduct a baseline health assessment.

Discussions with staff from the California Department of Health Services (DHS) have lead us to conclude that such a study would have great limitations, and the chance that it would generate useful results is small. Nevertheless, the Review Committee maintains the prerogative to recommend that a baseline health study should be conducted.

10. *Based on available data, DTSC determined that cyanides were not found at significant levels and did not warrant further investigation. While the analysis presented in the Review Draft reached a similar conclusion, the presentation made during the February 15 Review Committee meeting recommended follow-up sampling for cyanide compounds. Therefore the conclusion presented Review Draft conflicts with the presentation to the Review Committee and the residents.* In conducting this review, OEHHA's objective was to determine if the scientific process used in the evaluation and cleanup was protective of the health of the residents. The scientific process that was used to evaluate the potential risks associated with cyanide compounds was not "air tight" because the analytical method used was only capable of detecting total cyanide compounds. Therefore, conservative assumptions were needed to interpret the data. During the oral presentation, OEHHA sought concurrence from the Review Committee members on the conclusions of its analysis of the cyanide compound data. We noted the potential deficiencies of our approach but did not recommend additional sampling from this class of compounds. Neither of the final two slides ("Topics for Discussion" and "Possible Follow-up Actions") mentions cyanide compounds.

II. Comments from Wilma Subra, President of Subra Company

A. Comments from Wilma Subra regarding the site documents received from OEHHA on December 15, 2005:

11. *Samples collected from the bottom of excavations between Buildings 28 and 29, Buildings 31 and 32, Buildings 33 and 34 and at Bayshore Park indicated the presence of B(a)P_{eq} concentrations ranging from slightly to substantially higher than the target cleanup goal. Furthermore, the number of samples collected was not sufficient to demonstrate that the target cleanup goal had been achieved. The excavated areas were back filled with clean imported soil before the full lateral and vertical extent of PAH contamination was completely characterized. Excavations should have continued until sampling indicated that the remedial action goal for B(a)P_{eq} had been achieved.*

The remedial strategy for the Midway Village complex included a target cleanup goal of 0.9 mg/kg B(a)P_{eq} and several engineering solutions to prevent direct contact with contaminants in soil. Removal of the upper two feet of contaminated soil and its replacement with clean imported backfill was the primary engineering solution adopted at the complex. While the statement that potentially significant concentrations of PAHs remain in soil is correct, the opportunities for exposure to

non-volatile PAHs in soil appear to have been minimized. This remedial strategy does not address potential exposure to volatile PAHs and other VOCs that can migrate through the soil column and into the indoor air of the residences. While there is no evidence to demonstrate that significant concentrations of VOCs are present in subsurface soil, we believe that the available VOC data are extremely limited and that unqualified conclusions regarding the significance of this pathway cannot be made.

- 12. Areas under homes, buildings, sidewalks and streets were not sampled. Only a few samples were collected from the excavation sidewalls, and analysis of these samples indicated B(a)P_{eq} concentrations well in excess of the target cleanup goal.*

Please see response to comment #5. We agree that the full lateral and vertical extent of contamination was not characterized before the excavations were backfilled with clean imported soil. Full characterization of the extent of contaminated soil was not an objective of the investigation of this property. The purpose of the investigation was to identify and remove contaminants that posed a threat to the residents via direct contact with contaminated soil.

- 13. The sandy material used to back fill the excavations allows for migration of the B(a)P into the shallower strata.*

For volatile PAHs and other VOCs (if present), this statement is correct. Volatile compounds can migrate upward through the clean soil. Eventually, these compounds will migrate to the surface and dissipate, so the potential for accumulation of significant concentrations in the backfilled soil is very small. The primary risk is their potential to accumulate in indoor air and be inhaled by residents. As noted in the February 15 Review Committee meeting, B(a)P and most PAHs are not volatile and not water soluble, and therefore they are not capable of moving either upward or downward in the soil column. For this reason, there is no mechanism for non-volatile contaminants to migrate from non-remediated areas into the clean backfill as long as the soil remains undisturbed.

- 14. The April 1999 Health Consultation conducted by ATSDR is based on outdated information. Therefore, a notification page should be attached to it stating that the discussion and conclusion sections are out-of-date.*

We agree, although a final decision on this suggestion should be left to ATSDR.

B. Comments from Wilma Subra regarding the February 2006 Review Draft

- 15. Post-remediation PAH concentrations in subsurface soil in the most heavily contaminated areas of the Midway Village housing complex still exceed the target cleanup goal. The remediation did not remove contaminated soils from under the housing units, buildings, sidewalks and streets. Less than 10% of the surface area in the most heavily contaminated portion of the complex was remediated.*

We agree with the first two statements. We did not verify the last statement regarding the remediated portion of the primary area of contamination, but 10%

appears to be a reasonable estimate since most of this area is covered by concrete and asphalt pavement and residential foundations.

16. Approximately 100% of the subsurface soils in the Primary contaminated area of the Midway Village Housing Complex are contaminated with PAHs.

This statement may be correct given that (1) the maximum depth of remediation was 2 or 5 feet bgs and (2) post-remediation verification samples collected from the bottom and sidewalls of the excavations consistently indicated the presence of PAHs in soil. However, it is likely that the PAH concentrations in some unremediated areas are below the target cleanup goal.

17. The sidewall and floor soils in the excavated contaminated areas contain contaminants above the target cleanup goal and thus have the potential to contaminate the clean fill material. This can result in contamination being readily available to people living and working in the remediated areas.

As noted in the response to an earlier comment, volatile PAHs and other VOCs (if present) are indeed capable of moving from contaminated source areas into the clean soil. Eventually, these compounds will migrate to the surface and dissipate, so there is little potential for accumulation of significant concentrations in backfilled soil. The primary risk is the potential for these compounds to accumulate in indoor air and be inhaled by residents. In contrast, B(a)P and the majority of PAHs are not volatile and not water soluble. These compounds are not capable of moving either upward or downward in the soil column. Therefore, as long as the soil remains undisturbed, there is no mechanism for non-volatile contaminants to migrate from non-remediated areas into the clean backfill.

Institutional controls such as the requirement to notify health agencies prior to any excavation and periodic inspections of the property were instituted to ensure that inadvertent mixing of contaminated and uncontaminated soil does not occur.

18. The Report should recommend that a monitoring plan be implemented to track the rate and quantity of contaminant movement from contaminated surface and subsurface soils beneath buildings, sidewalks and streets into the clean fill material.

The revised report addresses this issue with two new recommendations. First, we are recommending that a soil gas investigation be conducted to determine if significant concentrations of volatile PAHs and VOCs are present in subsurface soil. Second, if the soil gas investigation demonstrates that volatile contaminants are present in subsurface soil, then the potential for these contaminants to attain hazardous concentrations in residential indoor air should be re-evaluated under “worst case” conditions (that is, conditions that favor accumulation of volatile contaminants in indoor air). As noted in the response to the previous comment, non-volatile PAHs are not capable of migrating from contaminated soil into the clean fill unless the two soils are physically mixed, as might occur during and excavation to repair underground utility lines.

19. *Based on the results of the 2002 indoor air study, the Review Draft concluded that the PAHs in indoor air do not represent a significant health risk. However, the available indoor air data do not provide an adequate basis for concluding that PAHs in indoor air do not represent a significant health risk. Additional indoor air and soil gas studies need to be performed in areas where surface and subsurface soils are or were contaminated with PAHs. These studies should be performed under a variety of weather and seasonal conditions. The text and conclusions should be changed to reflect the inadequacy of the available data and should recommend additional indoor air sampling.*

We agree that there is a need for additional information on potential indoor air exposure to volatile contaminants. The report has been revised and now includes recommendations for a soil gas investigation and possible follow-up studies of volatile contaminants in indoor air. The soil gas investigation should be conducted under conditions that favor contaminant accumulation (i.e., following a period when rain and landscape irrigation have not occurred for several days). If the results of this study indicate that VOCs and/or volatile PAHs are present in soil gas, then the data should be evaluated to estimate potential exposure to these compounds in indoor air. If this evaluation suggests that indoor concentrations are potentially high enough to present a significant health risk to the residents, additional studies directly measuring the concentrations of these compounds in indoor air may be warranted.

20. *Transformers containing PCBs may have been stored at PG&E's Martin Service Center for many years after PCBs were banned from commerce in 1976. Thus there is sufficient reason to sample soil in the northern portion of complex for PCBs. A recommendation for analysis of PCBs in soil should be included in the report.*

We agree that PCB-containing transformers may have been stored at the Martin Service Center. However, PCBs are like non-volatile PAHs insofar as they do not readily evaporate and are not soluble in water. Therefore under normal circumstances there would be little potential for PCBs to migrate from the Martin Service Center over to the Midway Village property. A catastrophic release of PCBs (for example, substantial spillage of transformer fluid or a transformer explosion) would have the potential to contaminate soil at Midway Village, but none of the documents we reviewed mentioned that such an event had ever occurred. It would be reasonable to conclude that a catastrophic release of PCBs would also result in contamination of soil at the Martin Service Center, but a review of DTSC's EnviroStor Database did not provide any indication that PCBs are chemicals of concern at this site.

The Review Draft noted that PCBs were not detected in any of the 426 soil samples collected during the June 2000 investigation. This information is incorrect. These samples were analyzed using U.S.EPA Method 8270, which is capable of detecting PCBs, but PCBs were not target analytes in this study. PCBs were detected in one of five soil samples collected during the 2001-02 removal action but the concentration was very low. This very limited data suggest that PCBs may be present at low concentrations in Midway Village soil. A screening

level assessment (i.e., a comparison of the detected concentration with the U.S. EPA's PRG for PCBs) suggests that PCBs in soil do not represent a significant health risk. However, the data are not compelling.

The Review Draft also noted that PCBs are immobile in soil and generally non-volatile, and that the remedial actions taken at Midway Village thus far should have minimized the potential for exposure to these chemicals. Of course, the validity of this conclusion relies in part on the presumption that areas contaminated with PAHs were co-located with areas contaminated with PCBs. In summary, Midway Village is located in close proximity to a PG&E Service Center and the limited data suggest that low concentrations of PCBs may be present in Midway Village soil. However, the remedial actions taken to minimize exposure to PAHs in soil should be equally effective in minimizing exposure to PCBs in soil. Therefore, additional sampling and analysis for PCBs in soil does not appear to be warranted.

- 21. Institutional controls (e.g., periodic inspections, ongoing maintenance and oversight of repairs) are performed by the San Mateo County Housing Authority. However, the Housing Authority addresses problems on an ad hoc basis and does not have the resources available to remedy problems on a timely basis. Resources are appropriated as needed, after problem areas have been identified. Measures should be taken to ensure that funds are available immediately to remediate problems as they are identified.*

This suggestion appears to be reasonable but is beyond the scope of our review. As noted in the report, DTSC conducts five-year reviews of all sites with ongoing operation and maintenance requirements. At Midway Village, these reviews include inspections to verify the integrity of all paved areas to ensure that exposure via direct contact with contaminated soil is not likely to occur. The last five-year review report for Midway Village was completed on June 19, 2002. The next five-year review is scheduled for 2007. OEHHA agrees that all paved areas need to be maintained on an ongoing basis to ensure that exposure to contaminants does not occur and the remediation strategy continues to be effective.

- 22. A health survey and assessment of current and past Midway Village residents, persons who were cared for or worked at the Midway Village daycare center, and people who participated in recreational activities at Bayshore Park should be performed.*

Based on the discussion that took place during the February 15 meeting, it appears that several Review Committee members agree with this recommendation. The decision on whether or not to conduct such a study ultimately must be made by the Department of Health Services in consultation with officials from DTSC.

- 23. Surface and subsurface soils are still contaminated and still pose a potential for exposure. Soil beneath the excavations and outside the boundaries of the excavated areas is contaminated with PAHs at concentrations above the remedial goal. The report should include a recommendation that the lateral and vertical*

extent of contamination need to be determined, including contamination under the residences, buildings, streets and sidewalks. A monitoring program should be implemented to track to locations of contaminants and their movement from contaminated source areas into the surrounding soil, groundwater and air.

As noted in the responses to previous comments, volatile PAHs and VOCs are the only contaminant classes capable of migrating from source areas into uncontaminated air, soil and groundwater. Consequently, we are recommending that a soil gas investigation be conducted. If the results of this investigation indicate that VOCs and/or volatile PAHs are present in soil gas, then the data should be evaluated to estimate potential exposure to these compounds in indoor air. If this evaluation suggests that indoor concentrations are potentially high enough to present a significant health risk to the residents, additional studies directly measuring the concentrations of these compounds in indoor air may be warranted.

24. *VOCs, PCBs, cyanide compounds and phenolic compounds may be present in subsurface soil and have not been adequately evaluated. A recommendation that these chemicals need to be investigated more thoroughly should be included in the report.*

Our recommendations for possible follow-up studies of volatile PAHs and VOCs are provided above, as is our recommendation for PCBs (see response to comment #20). With regard to cyanide compounds, an analysis of the potential health risks associated with exposure to these compounds is presented in the report. The analysis suggests that cyanide compounds do not represent a significant health risk at Midway Village. Based on the results of the June 2000 investigation in which phenolic compounds were detected in just two of 184 surface soil samples, we do not believe that additional investigation of phenolic compounds is warranted.

25. *The report should include recommendations for a soil gas investigation and additional studies of the possible presence of volatile chemicals in indoor air.*
These recommendations are included in the revised report.

26. *The target remediation goal of 0.9 mg/kg B(a)P_{eq} was only achieved on less than 10% of the contaminated surface areas of the site.*

As an approximate estimate of the proportion of the complex that was remediated, this statement appears to be correct. However, the remaining unremediated areas are largely covered with buildings, housing, and concrete and asphalt pavement. Therefore there is no opportunity for direct contact with contaminated soil. However, the unremediated areas may be potential sources of exposure to volatile PAHs and VOCs in indoor air. We have recommended that a soil gas investigation be undertaken to investigate this possibility.

27. *The Review Draft states that the risk management decisions and remedial actions taken at Midway Village appear to be consistent with relevant federal risk management guidelines. However, the lateral and vertical extent of PAH*

contamination have not been completely characterized, all potential contaminants have not been fully evaluated, available indoor air data are not adequate to evaluate potential human health risks, and a soil vapor investigation has not been performed. These data are essential in order to make fully informed risk management decisions.

We agree that additional data are needed in order to fully ensure that the health of the residents of Midway Village is protected. Complete characterization of the lateral and vertical extent of non-volatile PAH contamination is not essential as long as exposure to the contaminants is prevented by engineering controls. Volatile PAHs and VOCs may be present in subsurface soil, and exposure to these compounds in indoor air represents a potentially complete exposure pathway. We have recommended that additional studies be undertaken to investigate to presence of these chemicals in subsurface soil and evaluate their potential to cause adverse health effects.

III. Comments received from Michael Dorsey, Chief of the Hazardous Materials Division, San Diego County Department of Environmental Health

28. *DTSC's oversight was done properly and to the extent required by law. I do not recommend additional sampling. I would however, suggest that air monitoring within the occupied units be done to ensure that the people living in those units are not being unnecessarily exposed. From what I can determine this was not previously done. I believe only unoccupied units were ever evaluated.*

We are recommending that an investigation be conducted to evaluate potential presence of volatile PAHs (such as naphthalene) and other VOCs in soil gas. Depending on the outcome of the soil gas investigation, additional evaluation of the potential health hazards of these chemicals in indoor air may be warranted. In the 2002 study, samples were collected while the gas-fired forced air furnaces were operating. For schools and commercial buildings, this does not necessarily represent a worst-case condition because volatile contaminants in indoor air may have been diluted by outdoor air.

29. *These people [Midway Village residents] are living on a hazardous waste site. Regardless of how well it was cleaned up there will always be a concern, valid or not, from these residents about their past, current, and future health. Psychologically this is a huge issue which many of them have no control over. If this was a wealthy community or a community that had strong political influence I think we all know that these people would be relocated and adequately compensated.*

We agree that past exposures may have the potential to impact the health of the residents of Midway Village now and in the future. As noted in our response to an earlier comment, a retrospective assessment of pre-remediation exposures and an assessment their potential to cause adverse health effects could address these concerns by (1) identifying the degree of cancer risk reduction achieved by remedial actions taken at the complex, and (2) helping us determine whether past exposures were potentially sufficient to cause adverse non-cancer health effects in

the residents. While the Review Committee can recommend that a retrospective assessment of potential health risks might benefit the residents of Midway Village, it does not have the resources to conduct such an assessment. Relocation and compensation are issues that are beyond the scope of OEHHA's scientific review.

30. *I think it is important for the Review Committee to continue to advocate for this community through the Secretary of Cal EPA to find away to relocate and compensate these people. I know that is outside of the box, but it is the right thing to do and it is something this committee and Cal/EPA should be doing.*

Relocation and compensation were major topics for discussion during the February 15 meeting of the Review Committee and Midway Village residents. However, these issues are beyond the scope of our review.

IV. Comments from Barbara Lee, Air Pollution Control Officer, Northern Sonoma County Air Pollution Control District

31. *The overall conclusion that potential exposures were well characterized and [have been] fully prevented should be revised.*

We have revised several portions of the report to highlight those areas where the characterization of the lateral and vertical extent of soil contaminants was incomplete. We did not conclude that potential exposures were fully prevented, only that the opportunities for exposure to non-volatile contaminants appear to have been minimized. That is, it is very unlikely that the residents will ever be exposed to these contaminants. Any scenario involving excavation of subsurface soil could result in exposure to contaminants in soil, but institutional controls (e.g., periodic inspections and notification requirements prior to excavation) have been adopted to ensure that these scenarios do not occur. We also concluded that volatile PAHs and VOCs are incompletely characterized, and recommended that additional investigation of the potential presence of these compounds in soil and perhaps indoor air is warranted.

32. *The Bay Area Air Quality Management District (BAAQMD) requires permits for the removal of contaminated soil. They would have insisted on tests for BTEX [benzene, toluene, ethylbenzene, and xylene]. They also should have been involved in the indoor air sampling and investigation of odor complaints. The lack of analysis in these areas is a significant flaw in the original site review. It seems at least possible, if not likely, that there is ongoing exposure to organic vapors.*

According to DTSC staff, when DTSC conducts remedial actions involving hazardous chemicals, the degree of involvement of the local air district varies from district to district. The July 2001 Initial Study & Negative Declaration states that BAAQMD guidelines for control of fine particulate emissions from construction sites were utilized to identify action levels for the 2001-02 removal action. For toxic air contaminants, the stated thresholds of significance were a cancer risk of 10^{-5} and a hazard index of 1.0, but specific procedures outlining

how these criteria would be achieved were not stated. BAAQMD apparently had no direct involvement in the air monitoring that was conducted during the removal action. Similarly, it does not appear that BAAQMD was directly involved in the 2002 indoor air investigation.

To address concerns about potential exposure to volatile PAHs and VOCs in indoor air, we are recommending that a soil gas investigation be conducted. Depending on the outcome of this investigation, additional indoor air studies may be warranted.

33. *I think a more comprehensive review of the potential contaminants at the site is in order for a variety of reasons.*

The report evaluated the available data for each class of potential contaminants that could be present in subsurface soil at Midway Village. Data gaps in the characterization of several chemical classes were discussed. For example, non-volatile PAHs and low levels of PCBs may be present in soil beneath residential foundations and pavement, but we believe the potential for exposure to these contaminants appears to be very small. Therefore the health risks associated with these contaminants have been managed. At present, the only classes of contaminants that might pose a risk of ongoing exposure are volatile PAHs and VOCs. To address data deficiencies for these compounds, OEHHA has recommended that a soil gas investigation be conducted.

34. *I believe the residents have raised questions about potential ongoing health effects that, while perhaps not conclusive certainly reach the threshold requiring further review. Based on the information available, I find it disturbing that no follow-up has been undertaken by any of the agencies with jurisdiction to do so.* Members of the Review Committee have discussed a possibility of a baseline health assessment of Midway Village residents and some believe it is warranted. However, the Review Committee can only make recommendations on this subject; it has neither the authority nor the resources to conduct such a study. To explore this possibility, OEHHA contacted public health experts from the California Department of Health Services (DHS). DHS believes that such a study would have great limitations, and the chance that it would generate useful results is small. Nevertheless, the Review Committee maintains the prerogative to recommend that a baseline study should be conducted.

35. *I also think the OEHHA evaluation should include a clear explanation of which agencies have jurisdiction and/or responsibilities over which areas. The limits on authority at DTSC, ATSDR, HUD, and others have never been fully articulated -- although I have asked many times.*

This suggestion has considerable merit but is beyond the scope of our scientific review.

36. *I understand that the direction to OEHHA was fairly narrow. Even if the report will not cover some of the issues I mentioned, I think it should state that follow-up in those areas is needed.*

As noted, we have recommended additional investigation of potential VOC contamination and indoor air exposure. If other members of the Review Committee believe there are additional issues that should be pursued, we welcome their input.

V. Comments from Residents of Midway Village

37. *OEHHA received comments from the following persons, all residents of Midway Village: Loretta Kay Payne, Irma Anderson, Frankie Rankins, Mary Tanner, Aaron Laurence, Maria V. Downing, Christa Laurence, Jennifer Avance, Trina R. Smith and Meghan Laurence-Lopez. These messages described a wide variety of illnesses and symptoms that these individuals and members of their family experienced while living at Midway Village. In addition, these residents asked to be relocated to other housing as soon as possible.*

Unfortunately, OEHHA is unable to determine whether the symptoms and illnesses described in these messages are due to past exposure to contaminants in soil at Midway Village. The scope of our review was limited to an analysis of DTSC's investigation and cleanup of contamination, and evaluation of risk management decisions to ensure they were supported by sound science and consistent with federal guidelines. In this regard, we have recommended additional investigation to ensure that residents are not being exposed to contaminants originating from subsurface soil.

Possible relocation and compensation also are not issues that lie within the scope of our scientific review.

VI. Comments from La Donna Williams, Executive Director of People for Children's Health and Environmental Justice

38. *The reports presented by OEHHA and Subra Company (Wilma Subra), on February 15, 2006 at the Review of the Midway Village Investigation and Cleanup meeting held in Oakland confirm what we've been saying, which is Midway Village is currently 100 % contaminated, has always been contaminated, and poses a threat to the health and lives of residents and all who has come in contact with Midway Village.*

Historical information, while limited, indicates that the site became contaminated some time after 1944 when the U.S. Navy used contaminated soil from an adjacent manufactured gas plant to grade the site for housing units. Since the remedial measures taken in 2001-02, the potential for residents to come into direct contact with contaminated soil appears to have been substantially reduced. We have recommended that additional studies be conducted to ensure that exposure to volatile PAHs and VOCs in indoor air does not represent a health risk to the residents.

39. *Both recent reports and the recent fact sheet confirm the existence of over 350 plus hazardous toxins still at Midway as well as the continuing exposures that exist at Midway. The most compelling evidence of the devastation caused by the*

toxic exposures at Midway came from current and past residents. They displayed and communicated their illnesses for all to see from children's birth defects, childhood brain damage, neurological damage/disorders, childhood and adult eye disorders (leading to blindness), skin rashes, tumors, abnormal genitals in children and adults, bloody noses, chronic severe headaches, digestive and respiratory disorders, asthma, hair loss, suicides, cancer and death. Therefore, your previous conclusions in your February 2006 report are wrong and misleading.

We agree that contaminants are still present in subsurface soil under the Midway Village, but ongoing contact with contaminated soil should not occur. We have recommended that additional studies be conducted to evaluate potential exposure to volatile PAHs and VOCs in indoor air.

At the public meeting on February 15, 2006, many of the residents identified a variety of illnesses and health complaints. Unfortunately, we are unable to determine if these illnesses are due to exposures to contaminated soil that may have occurred in the past, prior to the most recent remediation.

- 40. These horrendous negative health affects suffered by current/former residents and housing employees, resulting from the many years of the hazardous exposures at Midway resulting from over 350 hazardous contaminants (PNA, VOCs, Cyanide, Lead, Arsenic, PCBs, Chromium VI etc.) currently existing at Midway has, and continues to be minimized and labeled as not significant by all the responsible parties, but especially from agencies such as OEHHA, and all other EPA agencies who are supposed to be protecting this community but has failed to do so.*

OEHHA was unable to determine if these reported illnesses are due to exposure to contaminated soil that may have occurred prior to the 2001-02 removal action.

Cyanide, lead, arsenic, and chromium VI were not identified as significant contaminants at Midway Village. Additional studies of volatile PAHs and VOCs are recommended, but the available data, while limited, suggest these chemicals probably do not constitute a significant health risk to the residents.

OEHHA has not attempted to minimize the seriousness of this matter and is dedicated to providing unbiased scientific evaluation and expertise to each of the Cal/EPA Boards and Departments. OEHHA took its role seriously in the determination of whether the remedial actions were adequate to fully protect the health of residents living at the Midway Village complex. Our goals were to ensure the application of sound science, the analysis of data in a manner consistent with the current practice of human health risk assessment, and the adoption of cleanup strategies and decisions in concordance with state and federal guidelines for management of health risks at properties contaminated with hazardous chemicals. The same evaluation standards were applied in the Midway Village site review as in any other community faced with similar issues.

- 41. Relocation must be ordered and included in your report for Midway Village residents IMMEDIATELY. There is no alternative remedy. Residents must be assisted with Relocation and Compensation so that they can begin the task of self-*

sufficiency, which they have been robbed of for decades due to the irresponsible and inadequate decisions, and lack of protective health measures handed down by agencies that have prevented them being self-sufficient and robbed them of the right to enjoyment of life.

OEHHA acknowledges that some residents believe federal and state responses have been inadequate.

The issue of relocation for Midway Village residents has been brought up to Agency level. The Agency is currently working for resolution on this issue with U. S. Department of Housing and Urban Development (HUD) and the San Mateo County Housing Authority.

42. *Not only have agencies failed to protect the health, lives and environment of the community, they have also knowingly allowed the continued exposures and threat to their lives to continue thus being guilty of practicing genocide in addition to being the cause of Midway's preventable illnesses, suffering and death and using current laws and an unjust court system to do.*

Many of the remaining comments were similar to this one, and OEHHA has chosen not to respond. The full text of the letter is included in Appendix C.

**Appendix C:
Comments on the
February 2006 Review Draft Report**

Comments from Dr. Stephen DiZio, Member of the Cal/EPA Midway Village Review Committee



Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA



Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200



Arnold Schwarzenegger
Governor

M E M O R A N D U M

TO: David Siegel, Ph.D., Chief
Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment

FROM: Stephen M. DiZio, Ph.D., Chief
Human and Ecological Risk Division Midway
Village Review Committee Member

DATE: March 9, 2006

SUBJECT: Comments Regarding Draft "Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California"

Thank you for the opportunity to review the draft report "Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California. Below are comments related to both the draft report, dated February 2006 and the information contained in the oral presentation provided by your staff at the February 15, 2006 public meeting. I have reviewed these with both staff and management in our Berkeley Regional Office responsible for the Midway Village Site, who have provided valuable supplemental information. The majority of my comments relate to the oral presentation and these are presented first. Given the extensive history and documentation associated with this site, I recognize the difficulty associated with gleaning the relevant information from the files necessary for your review. I am certain that our Berkeley Regional Office will make the files available for your review at a time that is convenient with you if you would like any additional information. Our staff is also available to answer any questions that you have regarding site information.

David Siegel, Ph.D.

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I. Responses/Comments on Oral Presentation and Slides

1. *A comment was made that no documentation existed on what occurred on the property prior to the construction of the military housing.*

In 1905, the San Mateo Power Company purchased the property now known as the PG&E Martin Service Center (PG&E-MSC) and built and operated a manufactured gas plant (MGP) from 1905 to 1916. The facility was used as an oil-gas plant whose Primary purpose was to supply gas for engines used to generate electricity. The plant was subsequently dismantled in 1916 and the land was left undeveloped for a number of years.

Review of a 1911 Plot Plan shows no MGP processes occurred on the area which is now called Midway Village. Documents obtained regarding the federal government condemnation process, conducted in 1944, implied that the area, which is now called Midway Village, was described as a swamp/marshland as it was under water during certain times of the year. (Please see the 1948 transcripts which are attached to DTSC's Unilateral Order (beginning on page 35] located at: <http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?globalid=41650007> Additionally, the Preliminary Endangerment Assessment dated December 1, 1986 provided information on site use. This document can be located at: <http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?globalid=41360093>

Based on this information, DTSC has no documentation which would imply that any commercial/industrial activities which used hazardous substances occurred on the Midway Village property prior to 1944.

2. *Within the Follow up Actions slide - Comments were made which indicated that additional sampling may be warranted. DTSC has grouped our comments by chemical type below:*

PAHs in Areas not sampled

During the 2000 sampling event over 400 samples were collected across all accessible areas within the Midway Village complex. This included 150 borings where samples collected between 0-6 inches and 1-1 1/2 feet below ground surface plus 10 additional samples collected at a depth of 10 feet all of which were tested for PAHs. Additionally, in 1989 and 1992 samples were collected and tested for PAHs. The soils associated with these samples may no longer be present on the site because of removal actions that were undertaken at the site. If there are accessible areas which should have been

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sampled but were not, please provide more specific information as to where this gap exists.

DTSC acknowledges that samples were not collected under existing hardscape (foundations, sidewalks, etc.) or taken to identify the bottom of the contaminated material.

As stated above, the Midway Village complex was a marshland area prior to the construction of the military housing facility. It was estimated that approximately 20,000 cubic yards of soil contaminated with gas plant residues were taken from the PG&E property and used as fill in the low spots at the current Midway Village and Bayshore Park sites. This was primarily done by grading the material. If volatile materials had existed in the gas plant residues after having been generated more than 25 years earlier, the grading activities would likely have released them in 1944. Because of the technique used to deposit the material, we can then technically assume that the concentrations found in the uncovered areas of the property would be the same as the covered portions, since the material was deposited prior to construction of the existing units.

DTSC did consider sampling under the homes. Sampling under the houses was considered problematic because the foundation blocked access to the soils directly below. Slant drilling could be used, but due to the angle of the boring, the sample would be collected significantly deeper than just below the concrete slab. The underground sewer, electrical and gas lines complicated the safety issues relating to sampling under the foundations. After the soil excavation and removal occurred in 2001, DTSC collected samples as close to building foundations as field conditions safely permit. These results were included in the *Midway Village/Bayshore Park Removal Action Completion Report dated November 22, 2002*. Other reports that contained PAH sampling data for Midway Village can be found in the *Soil Sampling Report dated September 26, 1990*, *Final Data Report dated June 1, 1990*, *Remedial Investigation Report dated June 30, 1993*, *Data Summary Report dated January 1, 2001*, and *Midway Village Data Summary Report Addendum Additional Samples dated August 1, 2001*. Documents are located at http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?global_id=41650007

Soil gas investigation of Volatile Organic Compounds (VOCs)

There is an overview here which is warranted. Manufactured gas activities used, across the nation, two starting components, coal or crude oil. Only a few facilities in California ever used coal (e.g. the former plant at Aliso in Los Angeles County), the overwhelming

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majority used crude oil. Those using coal, both nationally and in California, had benzene, ethyl benzene, toluene, or xylene, all VOC's associated with the soils. Those using crude oil have no VOCs detectable in soil gas associated with the waste material. The former manufactured gas plant associated with Midway village used crude oil.

Review of existing data at Midway Village and the adjacent properties, Bayshore Park and PG&E-MSD, did not detect elevated levels of VOCs in either soil or groundwater except for contamination related to an underground storage tank located at PG&E-MSD. That tank was located near Geneva Street which is 600 feet cross gradient from the Midway Village complex. DTSC protocol typically requires a soil gas investigation if we have documentation which would indicate the possible presence of VOCs. Please explain what information exists to support the need for a soil gas investigation.

Investigations conducted to date for BTEX and VOCs have found:

- The 1993 Remedial Investigation Report for Midway Village includes the results of 26 samples which were tested for chlorobenzenes and other BTEX compounds. There was only one detection of toluene at 0.99 ug/kg (ppb). The residential U.S. Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goal (PRG) for toluene in soil is 520,000 ppb.
- The 1999 Soil Quality Evaluation dated February 24, 1999 for Bayshore Park analyzed 26 samples taken from multiple depths in six locations for the entire suite of VOCs. All VOC results were non-detect. The sampled MGP waste material is the same as that on the Midway Village site and its placement occurred at the same time as the placement of the material on Midway Village.
- Results of approximately 80 samples which were analyzed for BTEX compounds from the adjacent PG&E-MSD Site which is impacted by the same MGP waste were presented in the PG&E-MSD 1988 Site Characterization Report. There were six detections of benzene with a maximum concentration of 2 mg/kg; five detection of toluene with a maximum detection of 0.5 mg/kg; four detections of ethyl benzene with a maximum detection of 8 mg/kg; and 8 detection of xylenes with a maximum detection of 3 mg/kg.
- Groundwater sampling collected from wells screened at approximately 20 feet below ground surface at Midway Village and Bayshore Park during the Remedial Investigation dated June 30, 1993 detected 2.1 ug/l benzene in well W-2. This concentration is slightly above the California Maximum Contaminant Level for drinking water of 1 ug/l. No other VOCs were detected. W-2 is located on the eastern portion of Bayshore Park closest to the PG&E property. Well W-1, which is located in the area where elevated PAHs occur on Cypress Lane, contained no VOCs. Historically, groundwater samples collected at the PG&E

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property just east of well W-2 have detected VOCs related to the underground fuel storage tank which was approximately 600 feet northeast (cross gradient) of Midway Village.

Investigations conducted to date for phenols:

- The 1993 Remedial Investigation Report dated June 30, 1993 shows the results of 71 samples collected in surface soils. Phenols were detected in approximately half of the samples. Results for total phenols ranged from non-detect to a high of 31 ppm. Elevated phenol concentrations were generally co-located with elevated PAH results.
- The 2001 Data Summary Report shows the results of 184 samples with only two detections with a maximum concentration of 0.26 ppm phenols. The current residential U.S. EPA Region 9 PRG (a screening value) for phenols is 18,000 ppm.

The above information can be found in the following reports: *Remedial Investigation Report dated June 30, 1993, Data Summary Report dated January 1, 2001, and Midway Village Data Summary Report Addendum Additional Samples dated August 1, 2001. Documents are located at:*

http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?global_id=41650007

The Soil Quality Evaluation Report dated February 24, 1999 is located at:

http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?global_id=41990001

The PG&E-MSC 1988 Site Characterization Report dated November 1 1988 which can be located at:

http://www.envirostor.dtsc.ca.gov/public/profile/report.asp?global_id=41360093

The draft February OEHHA report indicates that low levels of various petroleum-derived and chlorinated VOCs were detected in early investigations. It further acknowledges this information and concludes "The time allotted for OEHHA's review did not allow for a careful review of the limited VOC data. However, it appears that VOCs were detected infrequently and at relative low concentrations. A retrospective analysis of the data will probably indicate that they did not contribute significantly to the overall risk compared to the risks associated with PAHs." The request for additional VOCs data in the February 15, 2006 presentation appears to be in conflict with statements made in the February report. Can you please provide/clarify the reasons as to why soil gas sampling should be conducted when the levels of VOCs were detected infrequently and at relative low concentrations?

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Speciation of Cyanide Compounds

Investigations conducted to date for cyanides have found:

- The 1993 Remedial Investigation Report shows the results of 70 samples collected in surface soils. Cyanide was detected in 17 of the samples. Results for total cyanides ranged from non-detect to a high of 41 ppm. The 2001 Data Summary Report shows the results of 184 samples with twenty-five detections. Results ranged from non-detect to 9 ppm total cyanide. The residential U.S. EPA Region 9 PRG (a screening value) for free cyanides is 1,200 ppm. By apply this screening value to total cyanides, an additional safety factor is applied. DTSC does not generally speciate cyanides unless significant concentrations above the screening levels are detected. Based on the available data, DTSC determined that cyanides were not found at significant levels and did not warrant further investigation.
- In the 1988 Site Characterization Report for the adjacent PG&E-MSC Site, approximately 80 samples were analyzed for cyanide. There were 32 detections of cyanide with a maximum concentration of 7.11 mg/kg. This site was impacted by the same MGP waste.

The above information can be found in the following reports: *Remedial Investigation Report dated June 30, 1993, Data Summary Report dated January 1, 2001, and Midway Village Data Summary Report Addendum Additional Samples dated August 1, 2001.* Documents are located at:

<http://www.envirostor.dtsc.ca.gov/public/profile report.asp?global id=41650007>

The PG&E-MSC 1988 Site Characterization Report dated November 1, 1988 which can be located at:

<http://www.envirostor.dtsc.ca.gov/public/profile report.asp?global id=41360093>

The OEHHA written report acknowledges the availability of a significant quantity of cyanide data. The written report evaluated the use of "Total Cyanide" data and concludes "According to Shifrin et al. (1996), the most prevalent types of cyanide compounds found at former MGP sites are relatively nontoxic iron-complexed forms such as ferric ferrocyanide (also known as Prussian blue). For this reason, comparison of the maximum detected total cyanide concentration to the PRG for free cyanide probably constitutes a very conservative, screening-level method for assessing potential health risk. The comparison...suggests that exposure to cyanide compounds in soil will not adversely affect the health of Midway Village residents." These statements conflict

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with the oral presentation and slides which recommended possible follow-up sampling for cyanide compounds. Please clarify the basis as to why additional cyanide sampling would be needed.

3. *Within the Follow up Actions slide – A Retrospective assessment of cancer risk and non-cancer effects was suggested.*

This is vague and must be more carefully defined. Please describe how this assessment would be conducted, for which populations, the methodology to be employed, and what its intended purpose would be.

4. *Within the Follow up Actions slide - A Baseline health assessment of residents was suggested.*

Please specifically describe what would constitute a baseline health assessment, whom the assessment will focus on and what is its intended purpose. Specifically differentiate the suggested assessment from what the Agency for Toxic Substances and Disease Registry (ATSDR) undertook. DTSC did involve ATSDR on the Midway Village project and ATSDR staff attempted to conduct a health survey. Please contact ATSDR at (415) 947-4317 to determine what actions they previously undertook. ATSDR has conducted three different Health Consultations, as documented below:

August 1988 – This consultation looked at upcoming construction activities and provided suggestions regarding additional controls and activities to reduce stress and potential exposure due to fugitive dust or physical hazards associated with excavations planned for the Storm Drain Replacement Project. Their recommendations were implemented.

April 1999 – This consultation looked at three issues: 1) was the site adequately characterized prior to the 1994 cleanup; 2) were past cleanups protective; and 3) is additional sampling required. The report recommended additional sampling but concluded that the capping and the 10 ppm total PAH cleanup goal were protective. The recommendations for the additional sampling were implemented in 2000.

June 1999 – This consultation looked at the results of DNA testing data which was provided to ATSDR. The report concluded: 1) The DNA data are inadequate to assess current levels of exposure to PAHs at the Site; 2) The DNA data cannot be used to predict adverse health effects for individuals living at Midway Village; and 3) ATSDR is not currently aware of any human biomarkers that can adequately assess potential health outcomes as a result of exposure to low levels of PAHs in the environment.

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Documents are located at:

http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=41650007

II. Comments on the published draft report “Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California”

On Page 6 in the second bullet, the report discusses some sample results from the baseball diamond in Bayshore Park.

The baseball diamond is at the opposite end of the Park and is not near the Midway Village complex. DTSC was not aware that OEHHA required sample results for areas outside of Midway Village. DTSC has significant information, including sampling data available for Midway Village (26 lateral feet of files), Bayshore Park (3 lateral feet of files) and PG&E-MSD (15 lateral feet of files). Because of the volume of information available, we were not able to put all of this information onto CDs. However, all of the information is available in the Berkeley Regional Office for OEHHA’s review. Please contact us to set up a time to review the files.

On Page 6, the report states that “the lateral and vertical extent of contamination at the site was never completely characterized.”

However, on page 7, the report does conclude that “the site has been adequately characterized for the purpose of making informed risk management decisions.” These statements appear to be in conflict. Can you please clarify? Again, we suggest reviewing the information in the Regional files prior to reaching these sorts of conclusions.

On Page 17, the report discusses the residual risk related to the 0.9 milligrams per kilogram (mg/kg) benzo(a)pyrene (B(a)P) equivalents as a cleanup goal.

While DTSC did use 0.9 mg/kg B(a)P equivalents as a target for excavation activities, DTSC generally achieved much lower numbers when conducting the 2001 cleanup, particularly in the top two feet of soil. The report does not discuss the results of shallow confirmation sampling. Specifically,

- near Building 22 (post excavation samples ranged from 0.006 – 0.013 mg/kg B(a)P equivalents);
- Building 23 (post excavation samples ranged from 0.111 - 0.286 mg/kg B(a)P equivalents);

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- Building 24 (post excavation samples ranged from 0.054 – 0.16 mg/kg B(a)P equivalents);
- Buildings 28 and 29 (post excavation sample 0.13 mg/kg B(a)P equivalents); and
- Buildings 34 and 35 (post excavation sample 0.13 mg/kg B(a)P equivalents).

These concentrations are significantly less than the target cleanup goal and would suggest that the actual residual risk is lower than what was discussed in the report.

Once again, I hope that these comments are helpful. Please contact me at (916) 255-6634, if you have any questions on the content of these comments. You can also contact Barbara Cook at (510) 540-3843 to review the site files.

cc: Val Seibel
Chief Deputy Director
Office of Environmental Health Hazard Assessment

Charles Salocks, Ph.D., DABT
Staff Toxicologist
Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment

Midway Village Review

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cc: Dorothy Rice

Deputy Director

Site Mitigation and Brownfields Reuse Program

Comments from Ms. Wilma Subra, Member of the Cal/EPA Midway Village Review Committee

Date: January 2, 2006

To: David M. Siegel
Charles Salocks

From: Wilma Subra

cc: Midway Village Review Committee

Subject: Midway Village and Bayshore Park Site - Review of Documents Provided as Background Information

The following comments are based on a review of the Background Information received from the Office of Environmental Health Hazard Assessment on December 15, 2005.

Midway Village and Bayshore Park Sampling and Remedial Actions

Buildings 28 and 29

Sampling in June 2000 (Document J) detected 9.248 mg/kg B(a)P eq at Station M150 between Buildings 28 and 29 at a depth of 3 to 3.5 feet (Figure 5). The B(a)P eq values at the shallower depths, 0 to 6 inches (Figure 3) and 1.5 to 2 feet (Figure 4) at Station M150 were less than the 0.62 mg/kg Site Screening Level. The results indicated the need for sampling at deeper depths even when the shallower soils meet the standard.

The 2001 Removal Action (Document P) resulted in the excavation of 110 cubic yards of soil from between Buildings 28 and 29 (Table 4.1) with the excavation extending to 5 feet below ground surface. After excavation, a single verification sample was collected from the central area of the excavation (Figure 5-8), not from the area where the Station M150 had identified B(a)P eq over the Site Screening Level. The verification sample contained 0.13 mg/kg B(a)P eq. This sample was not adequate to confirm that the contamination in the area of sampling station M150 had been completely addressed through excavation.

Buildings 31 and 32

Sampling in June 2000 (Document J) detected B(a)P eq in excess of the 0.62 mg/kg Site Screening Level between Buildings 31 and 32. The B(a)P eq values exceeded the 0.62 mg/kg Site Screening Level at Station M03 (Figure 4) between 1.5 and 2 feet below ground surface (1.393 mg/kg) and at Station M147

(Figure 5) between 3 and 3.5 feet below ground surface (2.215 mg/kg) and 4.5 and 5 feet below ground surface (13.113 mg/kg).

The 2001 Removal Action (Document P) excavated the entire area to 5 feet below ground level and removed 612 cubic yards of soil (Table 4.1). Following excavation, two verification locations were sampled (one of which was collected in duplicate) from the base of the excavation. The verification sample locations were not near the M03 location (June 2000) that contained 1.393 mg/kg B(a)P eq at 1.5 to 2 feet depth. One verification sample, MVB 32-01 was west of station M147 (June 2000) which contained B(a)P eq at 3 to 3.5 feet (2.215 mg/kg) and 4.5 to 5 feet (13.113 mg/kg). The verification Sample MVB 32-01 contained a B(a)P eq concentration of 13.6 mg/kg which is 15 times greater than the B(a)p eq Remedial Goal of 0.9 mg/kg. Even though the soil at location MVB 32-01 exceeded the Remedial Goal of 0.9 mg/kg by 15 times, the contaminated soil was left in place and the area back filled. The excavation activity did not address all of the B(a)P soil contamination in excess of the Remedial Goal in the excavated area.

Buildings 33 and 34

Sampling in June 2000 (Document J) detected B(a)P eq at Stations M06 (0 to 6 inches - 0.909 mg/kg and 1.5 to 2.0 feet - 0.789 mg/kg) and M149 (3 to 3.5 feet - 22.678 mg/kg and 4.5 to 5.0 feet - 27.988 mg/kg) between Buildings 33 and 34.

The 2001 Removal Action (Document P) excavated contaminated soil down to 5 feet below ground level and removed 420 cubic yards of contamination (Table 4-1) from between Buildings 33 and 34. During excavation, odors were detected in the area of the back fence and dark tar-like material was discovered near the west boundary of the excavation. It is not clear from the report whether the dark tar-like material was completely excavated. A drum with residual material was also encountered during the excavation and was removed as part of the excavation operation.

After excavation, four verification samples were collected from the base of the excavation. Two of the four samples exceeded the Remedial Goal of 0.9 mg/kg B(a)P eq. Verification sample MVB 33-03 contained 24 times more B(a)P eq than the goal (21.954 mg/kg) and MVB 33-04 contained 22.3 times more B(a)P eq than the Goal (20.112 mg/kg). Verification sample MVB 33-03 was in the general area of sample M149 which had elevated B(a)P eq levels at 3 to 3.5 feet (22.678 mg/kg) and 4.5 to 5 feet (27.988 mg/kg). These values correlated with the verification samples collected at the base of the 5 foot excavation. This data demonstrated that contamination more than 20 times the Remedial Goal remains in the soil between Buildings 33 and 34. The Remedial Action Plan of June 1993 (Document A) defined the area between Buildings 33 and 34 as the highest Total PNAs soil contamination area of the Midway Village site (Figure 3.2). This area between Buildings 33 and 34

should have had the extent of B(a)P eq contamination completely delineated and the soil contaminated above the Remedial Goal removed and properly disposed.

Bayshore Park

The Bayshore Park area was remediated by excavation to a depth of two feet below ground level in 2001 (Document P). The excavation was performed in three phases: Phase I Midway Village Housing Office and Day Care Center, Phase II northern two thirds of the Park and Phase III City of Daly City Water Main. The verification samples exceeded the Remedial Goal of B(a)P eq at 3 of the 14 locations in Phase I (21 % of the area - the 3 stations that exceeded were located immediately south of the Day Care Center), 29 of the 50 locations in Phase II (58 % of the area - exceedences primarily in the northern portion of the site), and 1 of 3 locations in Phase III. The highest exceedence value was detected in Phase II, 62.79 mg/kg - 70 times larger than the Remedial Goal.

The areas of Bayshore Park where the B(a)P eq soil concentrations exceeded the Remedial Goal should have been excavated until the soil concentrations met the Remedial Goal and then back filled. Currently 50 % of the Bayshore Park area exceeds the Remedial Goal two feet below the soil surface.

Areas of Waste Remaining on the Site and Not Addressed

The Remedial Action activities did not include removal of contaminated soils from under homes, buildings, side walks and streets. There is the potential that large quantities of contamination remain on site at and/or very near the surface.

There are areas of highly contaminated soils along the side walls of the excavated areas. No side wall sampling of the excavated areas was performed to identify soil contamination levels and therefore no data has been generated on which to base additional corrective actions. A few examples of where side wall contamination has the potential to exist are near Building 24 with a concentration of B(a)P eq of 25.815 mg/kg at a depth of 2.5 feet below ground level, between Buildings 31 and 32 with B(a)P eq concentrations of 13.6 mg/kg at 5 feet depth, and between Buildings 33 and 34 with B(a)P eq concentrations greater than 20 mg/kg at 5 feet depths.

Areas where contamination of soil in excess of the B(a)P eq Remedial Goal has been documented on the base of the excavation areas is between Buildings 31 and 32, between Buildings 33 and 34 and potentially between Buildings 28 and 29.

Areas of the site have been documented to be contaminated below the two foot level while the shallower areas are not contaminated. In June 2000 only 5

locations were sampled in the Cypress Lane area to a depth of 5 feet. This limited sampling was not adequate. There is a need for deep sampling to be performed throughout the site (including Bayshore Park and south of Midway Dr.) in order to fully delineate the extent of contamination and identify areas of remaining contamination under perviously remediated areas.

The verification sampling performed on the base of the excavations was inadequate and allowed contaminated soil to remain on site. Additional confirmatory sampling is needed to identify soil contamination on site in the base layers. A large number of samples and strategic locations of samples in known contamination areas are necessary in order to prevent residual contaminated soil from being left on site. The sandy material used to back fill the excavations allows for migration of the B(a)P into the shallower strata. The apparent lack of a process to seal wires and pipes where they enter the homes, allows for migration pathways for air born contamination to enter the homes.

ATSDR

ATSDR performed a Health Consultation on the Midway Village Site in 1999. The Health Consultation was based on the data collected prior to the 1994 removal action and was based on a 10 ppm total PAH soil cleanup level. Institutional controls were recommended to remain in place at Midway Village in order to reduce exposure to subsurface contaminated soil.

Since the 1999 ATSDR Health Consultation, additional contamination in the surface soils of Midway Village and Bayshore Park have been identified, more stringent cleanup standards have been established and soil removal has been performed in 2001.

The discussion section and report conclusions presented in the ATSDR April 8, 1999 report focused on adequate characterization of Midway Village contamination prior to cleanup actions, sufficiency of cleanup actions to protect the residents of Midway Village, need for additional environmental sampling at Midway Village, effective measures to limit exposure to contamination remaining at the Midway Village site and adequacy of 10 ppm total PAH cleanup level. The information on which the ATSDR Health Consultation was based is outdated and the discussion and conclusions are no longer appropriate based on the outdated information. A notification page should be attached to the April 8, 1999 Health Consultation indicating that additional information is currently available which makes the Discussion and Conclusions section of the report out of date. References should be provided to more up-to-date reports. This mechanism will prevent the use of the 1999 Health Consultation as the final word and direct interested individuals to current information concerning the Midway Village site.

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Date: February 13, 2006

*To: David Siegel
Chief, Integrated Risk Assessment Branch
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*Charles Salocks
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*From: Wilma Subra
Subra Company
P. O. Box 9813
New Iberia, LA 70562*

*Subject: Comments on the Review of the 2001 Investigation and
Cleanup of the Midway Village Residential Complex in Daly
City, California, Draft Review, February 2006*

The Midway Village Review Committee was tasked with reviewing the available documents to determine if the scientific process used in the evaluation and cleanup of the Midway Village Complex was adequate to fully protect the health of residents living at the Midway Village Complex. Initial documents were received from OEHHA on December 15, 2005. Based on a review of the documents provided by OEHHA, comments were submitted January 2, 2006 (Subra, January 2, 2006, copy attached). On January 31, 2006, the Draft Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California, prepared by Charles Salocks of OEHHA and dated February 2006, was received. A review was performed of the Draft Review and the following comments are offered. These comments should be considered in combination with the comments previously submitted on January 2, 2006.

Living on Top of Contaminated Soil

The Midway Village Housing Units are still situated on top of Polycyclic Aromatic Hydrocarbons (PAHs) contaminated surface and subsurface soils and adjacent to PAHs contaminated subsurface soils which exceed the Clean Up Target Remedial Goal established for the area.

Significant portions of the Midway Village Housing Complex were built on top of contamination consisting of chemical residues from a former Manufactured Gas Plant which operated from 1905-1916. The Midway Village Housing Complex Primary contamination area has soil PAHs concentrations in excess of the Target Remedial Goal in the area surrounded by Midway Drive to the south, Schwerin Street to the west, the former Manufactured Gas Plant/PG&E Martin Service Center to the north and Bayshore Park to the east. Some remediation of PAHs in the soil occurred in 1990 (Clean Up Goal 10 ppm total PAHs) and in 2002-2003 (Target Remedial Goal 0.9 mg/kg Benzo(a)pyrene equivalents).

The remediation did not remove contaminated soils from under the housing units, buildings, side walks and streets. Contaminated soils still exist in both excavated areas, and unexcavated areas.

-Less than 10 % of the surface areas in the Primary contaminated Midway Village area has been remediated. Remediation of surface contaminated soils only occurred in easy to get to areas.

-Contaminated subsurface soil exist below the areas where surface soils were remediated as well as in unremediated areas. Approximately 100 % of the subsurface soils in the Primary contaminated area of the Midway Village Housing Complex are contaminated with PAHs.

-Contaminated surface soils exist under the housing units, buildings, side walks and streets in approximately 90% of the Primary contaminated area of the Midway Housing Complex.

The large areas of contaminated surface soils and subsurface soils are in direct contact with the "clean fill material" used to fill in the excavated/remediated areas. The side walls and floor soils in the excavated contaminated areas contain contaminants above the Cleanup Target Remedial Goal and thus the potential to contaminate the "clean fill material" which can result in contamination being readily available to people living and working in the Primary contaminated area of the Midway Village Complex.

A recommendation should be included in the Report that would require the implementation of a monitoring program to track the rate and quantity of movement of the contaminants in the surface and subsurface soils under housing complex, buildings, side walks and streets into the "clean fill material."

Contaminant migration distances and rates and contaminant concentrations should be established that would trigger additional remedial activities in the areas of the impacted “clean fill” and for the contaminant source areas. These measures are not an alternative to remove/relocation of the people living on top of contaminated soil but will serve to evaluate the movement of contaminants on and under the site. The program should be initiated immediately due to the fact that remedial activities and installation of “clean fill” activities have occurred 16 and 3 years ago, respectively.

Indoor Air

Samples of indoor air were collected from five Midway Village Residential Units, the Homeowners Association Office, Bayshore Child Care Center and two schools located near Midway Village, between June 17 and 22, 2002. Based on a review of all of the data provided by OEHHA to the Review Committee, these indoor air samples are the only samples collected and analyzed to identify indoor air exposure to the Midway Village community members.

The samples were collected for a minimum of 24 hours as the gas-fired furnace units were operational in the housing units tested. Based on the results of the 2002 study, the OEHHA Draft Review concluded that the PAHs in indoor air do not represent a significant health risk. The conclusion also points out that the upward migration of volatile PAHs and subsequent inhalation of indoor air does represent a potential complete exposure pathway.

As demonstrated in the previous section, the housing units of Midway Village are located on top of PAHs contaminated soil. The contaminated soils under the housing units have not been removed during the remedial process. The use of only one set of a very few indoor air samples is inadequate on which to base the conclusion statement that PAHs in indoor air do not represent a significant health risk. Additional indoor air sampling and soil gas analysis of the soils under the housing units and buildings needs to be performed in the housing units and buildings located in areas where surface and subsurface soils are or were contaminated with PAHs. The removal of contaminated soils from areas adjacent to the housing units did not address the contaminated soils under the housing units and associated structures on the Midway Village site. The additional indoor air samples and soil vapor gas monitoring should be performed during a variety of weather and seasonal conditions in order to determine if volatilization and migration of PAHs from the contaminated soils into the housing units are a potential risk to the health of people living, working and attending school on top of the Midway Village contaminated soils.

The text and conclusion in the Review Report should be changed to more accurately reflect the current lack of adequate data and recommendations included for the planning and performance of additional indoor air monitoring and initial soil gas analysis for PAHs.

PCBs

According to the Draft Review and information in a number of the documents provided by OEHHA for review by the Review Committee, PG&E acquired control of the property adjacent to Midway Village in 1979. PCBs were banned from commerce in 1976 and the Draft Review indicated that “PG&E could not have conducted operations on this property when PCBs were most likely to have been involved in these operations.” However, PCB containing transformers, in use at the time of the ban, continued to be used for many years after the ban. When problems were encountered with these PCB containing transformers they were returned to operations yards such as the one adjacent to Midway Village. There is thus sufficient reason to sample the soils in the northern portion of the Midway Village complex for residue levels of PCBs. Such a recommendation for PCB sampling and analysis of the soils should be included in the recommendations section of the Review report.

Institutional Controls

In the Executive Summary of the Draft Review, it is stated that Remedial Action and Institutional Controls on Land Use are sufficient to prevent significant exposure to contaminants in surface and subsurface soils. The institutional controls are dependent on actions of the Housing Authority to perform site assessments, site maintenance and remedies of defects in order to prevent significant exposure of contaminants in surface and sub/surface soils. The Housing Authority has signed a 30 year operations and maintenance agreement to maintain the remedy and cap. Periodic inspections of the Midway Village Housing complex area, Field Office and Day Care Center, and Bayshore Park are performed by the Housing Authority. The Housing Authority is required to perform inspections and remedial activities on a regular basis. When problems are identified, the Housing Authority is responsible for remediation of the problems. It appears, based on recent correspondence, that the Housing Authority is not able to remediate the problem areas until resources are appropriated. In order to ensure the adequacy and effectiveness of the institutional controls, sufficient resources should be available on an ongoing basis to immediately remediate problem areas. There should not be a need to appropriate funds after problem areas are identified. This requires putting off addressing the problem areas until resources are appropriated. Measures should be immediately taken in order to have adequate funds immediately available to remediate problem areas as they are identified.

Tracking of Human Health Impacts

The community members currently and previously living in the Midway Village Housing Complex have consistently reported health impacts. Health surveys, assessments, monitoring programs and tracking programs should be performed on current and past residence of the Midway Village Complex, people who work or attend daycare on the site, and people who recreate on the Bayshore Park facilities.

Review Draft Conclusions

Second Bullet

The second bullet item of the Conclusions section of the Review Draft stated that “the lateral and vertical extent of PAHs contamination in subsurface soil has not been completely characterized, but potential for exposure to these contaminants has been substantially reduced or eliminated by the remedial actions that have been taken.”

The conclusion item is correct in that the lateral and vertical extent of PAH contamination in subsurface soils has not been completely characterized. However, the second part of the conclusion, potential for exposure has been eliminated is incorrect. Contamination of surface and subsurface soils still exist on the site and pose a potential for exposure. The base of the excavations are contaminated with PAHs above the Remedial Goal. The side walls of the excavations have not been sampled but side wall areas adjacent to high concentrations of PAHs have been identified in the Subra report of January 2, 2006, in the section entitled “Areas of Waste Remaining on the Site and Not Addressed.”

The lack of information on the lateral and vertical extent of contamination and the lack of information on the extent of contamination that has migrated or been transported into the “clean fill soil” points out the lack of adequate information on which to base the statement concerning substantial reduction in potential for exposure. The recommendations to address the “clean fill” contamination situation are addressed in the section of this document entitled “Living on Top of Contaminated Soil.” A recommendation should also be included to determine the lateral and vertical extent of PAH contamination on the site. This recommendation should also include determination of the lateral and vertical extent and concentrations of contamination under the Housing Complex, buildings, streets and side walks.

The areas of the highest soil contamination concentrations and concentrations over the Remedial Goal must be identified and delineated, and a monitoring program established and implemented to track the locations of contaminants in the soil, the potential for the contaminants to migrate into surrounding soils, ground water and air and the potential need to excavate and remove the

contamination hot spots where ever they are located.

Third Bullet

The third bullet states that other contaminants may be present in subsurface soils. The conclusion is stated that direct contact exposure pathways are not complete. However, a number of chemicals have not been evaluated as part of this Review. Some of the chemicals not adequately reviewed consist of Volatile Organic Compounds (VOCs), PCBs discussed elsewhere, Cyanide compounds and phenolic compounds. A recommendation should be included in the Review Report that requires a more adequate review of the chemicals listed above in the surface and subsurface soils, soil vapors and indoor air.

Fourth Bullet

The fourth bullet has been address in the Indoor Air section of this document. The Recommendation focuses on the planning and performance of additional indoor air monitoring during a variety of weather and seasonal conditions in order to determine volatilization and migration of PAHs and performance of soil vapor gas analysis for PAHs in the soils under the Housing Units and buildings.

Fifth Bullet

The fifth conclusion bullet lists the cancer risk associated with the Target Remedial Goal of 0.9 mg/kg B(a)P equivalents. However, the item fails to clarify that the Target Remedial Goal was only attained on less than 10% of the contaminated surface areas of the site.

Seventh Bullet

The last conclusion bullet states that risk management decisions and remedial actions appear to be consistent with relevant federal risk management guidelines. However, the lateral and vertical extent of PAH contamination has not been completely characterized. All of the chemicals that may be present in the soils of the site have not been evaluated. The indoor air samples do not provide adequate data on which to evaluate health risks. Soil vapor analysis have not been performed in the soils under the Housing Units and buildings on the site. These data points are critical in order to make risk management decisions and to conduct remedial action activities.

In a decision rendered by the Civil District Court in Orleans Parish, Louisiana on January 12, 2006, the court found that citizens living on top of a municipal landfill that had hazardous waste disposed of in the landfill before hazardous

waste regulations were promulgated, were entitled to compensation for emotional distress based on the years of residence on the hazardous waste site. Those living on top of the land fill were african american and were living in HUD subsidized housing. The \$20 million dollar remedy implemented in 2000 and 2001 was removal and replacement of 2 feet of contaminated soil and waste from the yards and other accessible locations. Waste was present on the site to a depth of 20 feet. The removal and replacement occurred on approximately 10 % of the site.

Removal and replacement did not occur under the houses, buildings, streets and sidewalks. A portion of the site contained single family dwellings that had been purchased under the HUD First Time Home Ownership program. The home owners were awarded fair market value for their homes in addition to the emotional distress compensation. This is an example of why the results of the type of remedy implemented at the Midway Village complex is not adequate to address the concerns of the people living on top of the waste.

Comments from Mr. Michael Dorsey, Member of the Cal/EPA Midway Village Review Committee

2/14/2006

Dear David and Committee Members:

As previously stated I will not be available to attend the meeting tomorrow in Oakland as I have previous commitments both internally and externally that preceded the date of this meeting. However, please let me provide the following regarding this issue from my perspective.

First, I think that DTSC's oversight was done properly and to the extent required by law. I do not recommend additional sampling. I would however, suggest that air monitoring within the occupied units be done to ensure that the people living in those units are not being unnecessarily exposed. From what I can determine this was not previously done. I believe only unoccupied units were ever evaluated.

Second, I will reiterate my previous opinion regarding this issue. These people are living on a hazardous waste site and regardless of how well it was cleaned up there will always be a concern, valid or not, from these residents about their past, current, and future health. Psychologically this is a huge issue which many of them have not control over. If this was a wealthy community or a community that had strong political influence I think we all know that these people would be relocated and adequately compensated.

Therefore, I think it is important for this committee to continue to advocate for this community through the Secretary of Cal EPA to find away to relocate and compensate these people. I know that is outside of the box, but it is the right thing to do and it is something this committee and Cal/EPA should be doing. I say this in all do respect, but this is a much more import issue for us to be addressing than getting continuous briefings about the Hydrogen Highway.

I wish you all the best tomorrow.

Sincerely,

Michael Dorsey, Chief
Hazardous Materials Division
County of San Diego Department of Environmental Health
(619) 338-2395

Comments from Ms. Barbara Lee, Member of the Cal/EPA Midway Village Review Committee

March 19, 2006

Hi Shankar & David,

I would really like to see the final draft of the OEHHA review of Midway Village before I send in an addendum. This would allow me to appropriately praise the work and conclusions, and to limit the discussion of other issues to those not covered in the report.

I have been out this past week with back problems (and am barely tolerating sitting at the computer long enough to send this email!), which is why you haven't heard from me sooner.

If you want to send me a "pre-release" draft, I'd be happy to look it over and have a phone call about it. A call is easier at this point b/c I can do that while flat on my back.

I do hope it goes further than the first draft did in a number of respects. At a minimum, the overall conclusion that potential exposures were well characterized and fully prevented should be revised. As to specifics, I thought the comments offered by Mike and Wilma were on point.

I also had questions about the lack of involvement with the BAAQMD at the outset, and ongoing; the air district does require permits for the removal of contaminated soil, and they would have insisted on tests for BTEX.

They also should be involved in the indoor air sampling and investigating the odor complaints. The lack of analysis in these areas is a significant flaw in the original site review, and it seems at least possible, if not likely, that there is ongoing exposure to organic vapors.

I think a more comprehensive review of the potential contaminants at the site is in order for a variety of reasons.

I believe the residents have raised questions about potential ongoing health effects that, while perhaps not conclusive certainly reach the threshold requiring further review. Based on the information available, I find it disturbing that no follow-up has been undertaken by any of the agencies with jurisdiction to do so.

I also think the OEHHA evaluation should include a clear explanation of

Midway Village Review

which agencies have jurisdiction and/or responsibilities over which areas.

The limits on authority at DTSC, ATSDR, HUD, and others has never been fully articulated -- although I have asked many times.

It is also not clear where the enforcement action now stands (i.e., has there been a judgement?).

I understand that the direction to OEHHA was fairly narrow. Even if the report will not cover some of the issues I mentioned, I think it should state that follow-up in those areas is needed. But regardless, I would like to see what is covered and what is not before I prepare the addendum.

I have not been idle, even if I haven't had access to my computer this past week. I had previously downloaded quite a lot of information (perhaps the collective weight of the documents contributed to my current problem...). In any case, I've reviewed a number of cases and guidelines, etc. So in addition to recommendations about the Midway case in specific, I have identified some "gaps" from an e.j. perspective, and I will cover those in my addendum.

Thanks for your patience. You've been great to work with!

Barbara

Comments from residents of Midway Village

OEHHA received comments from the following residents of Midway Village:

Loretta Kay Payne

Irma Anderson

Frankie Rankins

Mary Tanner

Aaron Laurence

Maria V. Downing

Christa Laurence

Jennifer Avance

Trina R. Smith

Meghan Laurence-Lopez

These messages described a wide variety of illnesses and symptoms that these individuals and members of their family experienced while living at Midway Village. In addition, these residents asked to be relocated to other housing as soon as possible.

Because these letters contained personal health information, OEHHA will not include the text of these letters.

Comment from Ms. LaDonna Williams

**PEOPLE FOR CHILDREN'S HEALTH &
ENVIRONMENTAL JUSTICE**

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February 23, 2006

Fax # (916) 322-

9705

Mr. Leon Surgeon
Office of Environmental
Health Hazard Assessment
PO Box 4010
Sacramento, California 95812-4010

Re: MIDWAY VILLAGE

Dear Mr. Surgeon and All Responsible Parties,

The reports presented by OEHHHA ,and Subra Company (Wilma Subra), on February 15, 2006 at the Review of the Midway Village Investigation and Cleanup meeting held in Oakland confirms what we've been saying which is Midway Village is currently 100 % contaminated, and has always been contaminated and poses a threat to the health and lives of residents and all who has come in contact with Midway Village.

Both recent reports and the recent fact sheet confirm the existence of over 350 plus hazardous toxins still at Midway as well as the continuing exposures that exist at Midway. The most compelling evidence of the devastation caused by the toxic exposures at Midway came from current and past residents. They displayed and communicated their illnesses for all to see from children's birth defects, childhood brain damage, neurological damage/disorders, childhood and adult eye disorders (leading to blindness), skin rashes, tumors, abnormal genitals in children and adults, bloody noses, chronic severe headaches, digestive and respiratory disorders, asthma, hair loss, suicides, cancer and death. Therefore, your previous conclusions in your February 2006 report are wrong and misleading.

These horrendous negative health affects suffered by current/former residents, and housing employees, resulting from the many years of the hazardous exposures at Midway

resulting from over, 350 hazardous contaminants (PNA, VOCs, Cyanide, Lead, Arsenic, PCBs, Chromium VI etc.) currently existing at Midway has, and continues to be minimized and labeled as not significant by all the responsible parties, but especially from agencies such as OEHHA, and all other EPA agencies who are supposed to be protecting this community but has failed to do so. Not only have agencies failed to protect the health, lives and environment of the community, they have also knowingly allowed the continued exposures and threat to their lives to continue thus being guilty of practicing genocide in addition to being the cause of Midway's preventable illnesses, suffering and death and using current laws and an unjust court system to do.

Although agency data confirms the existence of current hazardous exposures and admit, many of the hazardous have not been adequately analyzed or evaluated, but do in fact exist at Midway, you still refuse to admit the obvious threat to human health, and lives existing at Midway because Midway is a community of color, with a large population of African Americans whom agencies' actions and decisions made on this site confirms you place no value whatsoever on their lives. The total disregard for the suffering you've caused resulting from your lack of protection and decisions allowing this continued threat has resulted in acts of genocide and death that residents have been forced to suffer for many years because of the racist attitudes of accepting African Americans to bear the inhumane burden of being exposed to levels of toxins you don't allow animals and industry to be exposed to. These racist practices that continues within OEHHA, CalEPA, Federal EPA and all other EPA agencies, offices and boards must stop. These acts can no longer be denied, or replaced with terms to justify your, unjust actions resulting in your racist practices, practiced nation-wide against African Americans. These facts are substantiated by the racist decisions and actions taken at the Agriculture Landfill site in Parish, Louisiana where that community also being large population of African Americans experienced the same exact racist decisions and lack of adequate protective measures practiced by Federal EPA and other agencies at exactly the same time as Midway. OEHHA uses the term the decisions or determinations were made with the available data which is of real concern because official records confirms Midway's files were ordered destroyed in 1982, thus hiding the serious threat to health, lives and high levels of toxins currently existing at Midway and Bayshore Park.

These are the acceptable practices and injustices being practiced especially against African Americans and low-income populations with no accountability of the responsible parties such as Pacific Gas & Electric Co and HUD who must be held accountable both financially and morally. Instead of agencies hold these responsible parties accountable, agencies have assisted them with their deceit, cover-up and criminals acts of damaging the health and lives of African Americans and other low-income populations and their families whom PG&E, HUD and all other responsible parties have determined are expendable and their lives and families have no value, and assisting them with covering up the wrongdoing. The levels of toxins or the numerous inhumane suffering at Midway, does not matter to you, because with all the undisputable evidence you continue to label the conditions (toxic levels, negative health affects cancer and death) insignificant because again you place no value on the lives, families or environment of people of color, but especially African Americans.

The current execution of Mr. Tookie Williams who was an African American, was executed recent lx (a month ago) although changing his life and influencing current gang members to stop their violence and change their lifestyle was not enough to delay his execution. However, the next current death row prisoner's execution was delayed using some law to delay his execution, who is a convicted child rapist and murderer has been spared, pending more consideration which he received because he was not BLACK!. This same law obviously existed to spare Mr. Tookie Williams' life but of course was not used because there is no value placed on the lives of African Americans, whom you all deem is expendable. These are further examples of the extent of the racist attitudes and unfair decisions practiced against African Americans at the hands of our government and agencies that are supposedly fair and unbiased, which we all know could not be further from the truth .

The unfairness and injustices practiced especially against African Americans and other low-income minorities continues in increasing alarming rates to be practiced by those in authority who knows it is wrong but simply do not care, and attempt to justify it by using the law and then benefit financially in the billions from our suffering. This is no different than what was practiced in the days of slavery, you're just using a modern day approach in hurting and harming and killing a population of people while using modern day laws to accomplish what you know to be unjust. You would never allow this for your families or communities, if it did happen it would be a public outcry and scandal and become blockbuster movies.

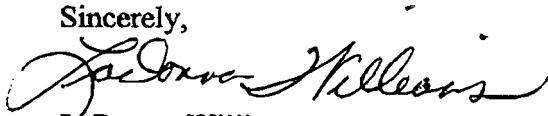
Relocation must be ordered and included in your report for Midway Village residents IMMEDIATELY. There is no alternative remedy. Residents must be assisted with Relocation and Compensation so that they can begin the task of self-sufficiency, which they have been robbed of for decades due to the irresponsible and inadequate decisions, and lack of protective health measures handed down by agencies that have prevented them being self-sufficient and robbed them of the right to enjoyment of life.

In the spirit of Fairness, Justice and righting the wrongs practiced for many years that continue currently against Midway, OEHHA must recommend Relocation, which must include Compensation from all the responsible parties whom have recently settled a lawsuit concerning the existence of hazardous toxins at Midway involving PG&E and all other responsible parties whom are paying an unnamed entity.

If you want African Americans to stop complaining of racism then stop the racist practices of Environmental Racism, racist attitudes of accepting these inhumane conditions, and inadequate actions and acts of deception such as those listed above that causes our outrage and outcries. Justice must be demanded for Midway that can begin with the recommendation of RELOCATION IMMEDIATELY, and COMPENSATION in your soon to be released report.

Midway Village Review

Sincerely,

A handwritten signature in black ink, appearing to read "LaDonna Williams". The signature is fluid and cursive, with a large initial "L" and a long, sweeping underline.

LaDonna Williams
Executive Director

**Appendix D:
Comments on the
April 2006 Review Draft Report**

Comments from Ms. Wilma Subra

SUBRA COMPANY
P. O. BOX 9813
NEW IBERIA, LA 70562
337 367 2216

Date: April 23, 2006

To: David Siegel
Chief, Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment
P. O. Box 4010
Sacramento, CA 95812-4010

Charles Salocks
Staff Toxicologist, Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment
P. O. Box 4010
Sacramento, CA 95812-4010

From: Wilma Subra
Subra Company
P. O. Box 9813
New Iberia, LA 70562

Subject: Comments on the Review of the 2001 Investigation and
Cleanup of the Midway Village Residential Complex in Daly
City, California, Draft Review, April 2006

The Midway Village Review Committee was tasked with reviewing the available documents to determine if the scientific process used in the evaluation and cleanup of the Midway Village Complex was adequate to fully protect the health of residents living at the Midway Village Complex. Initial documents were received from OEHHA on December 15, 2005. Based on a review of the documents provided by OEHHA, comments were submitted January 2, 2006 (Subra, January 2, 2006). On January 31, 2006, the Draft Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California, prepared by Charles Salocks of OEHHA and dated February 2006, was received. A review was performed of the February 2006 Draft Review and comments submitted in writing and at a

public meeting on February 15, 2006 (Subra, February 13, 2006). On April 12, 2006, a document entitled Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California, Draft Report prepared by Charles Salocks of OEHHA and dated April 2006, was issued. The Draft Report was reviewed and comments provided to OEHHA in a conference call on April 18, 2006 and in this document. These comments should be considered in combination with the comments previously submitted on January 2, 2006, February 13, 2006 and in the conference call of April 18, 2006.

Midway Village Housing Complex is Situated on Top of Contaminated Soil

The community members living in the Midway Village Housing Units are still living on top of soil contaminated with Polycyclic Aromatic Hydrocarbons (PAHs) from a former Manufactured Gas Plant. The Housing Units have cracks in the foundations, floors, walls and between the foundations and the structure walls which allow for the exposure of community members to contaminants in the soils under the Housing Units. The surface and subsurface soils under the Housing Units and the subsurface soils in areas where partial cleanup has been performed exceed the Clean Up Target Remedial Goal established for the PAHS at Midway Village.

The historical as well as ongoing exposure of the community member to the contamination is inappropriate. The OEHHA should work with the appropriate local and federal housing authorities including HUD to address the issue of relocation of Midway Village community members.

Investigation and Cleanup Statement in Draft Report

Executive Summary, Page 1, first paragraph, line 4.

The Draft Report states “Investigation and cleanup of contamination at the complex...” The descriptor in this statement of cleanup should be modified to reflect that only partial removal of contaminated soil has been performed.

Scope of Review, page 3, second sentence.

The Draft Report once again stated “investigation and cleanup of contamination...” The descriptor cleanup should be modified to reflect that only partial removal of contamination of soil was performed.

Nature and Extent of Surface Soil Contamination

Executive Summary, page 1, paragraph 5.

The Draft Report states “We have concluded that the nature and extent of contamination by nonvolatile polycyclic aromatic hydrocarbons

(PAHs) in surface soil was adequately characterized. The nature and extent of contamination was only determined in areas of exposed surface soil. The areas under buildings, sidewalks and streets were not sampled. The sentence should be changed to reflect the limited surface soil area (estimated at approximately 10 % of the site) that has been evaluated.

Conclusions, page 20, first bullet.

The Draft Report Conclusions contains a similar sentence concerning the characterization of nature and extent of contamination of surface soils. The sentence should be changed to reflect that the surface soil evaluation was limited to exposed surface soil only.

Draft Report Conclusions

Comments on the Draft Report Conclusions section were provided in detail in the February 13, 2006 Subra comments.

The detailed comments should be considered and included in the OEHHA report.

Previous Submitted Comments

As previously stated, written comments have been submitted to OEHHA on the Midway Village issue on January 2, 2006 (Subra January 2, 2006) and February 13, 2006 (Subra February 13, 2006). The substance of these comments has not been repeated in this document and thus the written comments should be considered by OEHHA and included as part of the OEHHA Final Report of the Review of the 2001 Investigation and Cleanup of The Midway Village Residential Complex in Daly City, California.



Dan Skopec
Acting Secretary
Cal/EPA

Comments from Dr. Stephen DiZio



Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200



Arnold Schwarzenegger
Governor

MEMORANDUM

TO: David Siegel, Ph.D., Chief
Integrated Risk Assessment Branch
Office of Environmental Health Hazard Assessment

FROM: Stephen M. DiZio, Ph.D., Chief
Human and Ecological Risk Division
Midway Village Review Panel Member

DATE: April 28, 2006

SUBJECT: Comments Regarding the April, 2006 Draft Report: "Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California"

Thank you for the opportunity to review the April 2006 revised draft report "Review of the 2001 Investigation and Cleanup of the Midway Village Residential Complex in Daly City, California. We will focus our comments based upon the objective, scientific information present in the site files in the Department of Toxic Substances Control Berkeley Regional Office, as well as the standard practices used by experienced site investigators. Our comments follow below:

David Siegel
April 28, 2006
Page 2

Overall Comments on the Report:

The report describes in some detail the documents reviewed by OEHHA. However, we find no reference or review of the records of Region 9 of the United States Environmental Protection Agency (USEPA), whose scientists and managers worked together with DTSC in the characterization of the soils leading up to the 2001-2002 removal activities. While the implication in the report is that sampling locations, target analytes, and risk management decision making was the sole province of the DTSC, these were, in fact, all part of a joint effort, under USEPA oversight.

One must consider the joint venture, and the site data itself, when testing the hypothesis that the characterization of the site for volatile organic compounds (VOC) was incomplete. Site characterization activities are conducted by scientists and engineers in a systematic manner, first testing for broad suites of chemicals, followed by a narrowing of the chemicals of concern. This was the case for all the events at Midway Village, and was repeated at the adjacent Bayshore Park. Experienced scientists and engineers from DTSC and USEPA agreed that at no time was any evidence presented which would warrant further work investigation at Midway village for VOC compounds. As a toxicologist, I consulted with these people on the data gathering process, as I am not a professional in the field of site investigation. We suggest that other professionals experienced in site investigation be consulted prior to issuing conclusions regarding investigations conducted in the field by DTSC and USEPA.

II. Specific Comments

1. Statements are made on pages 11 and 12, and reiterated in the conclusions on page 21, that additional soil gas investigations are warranted. Exhaustive examination of the existing soil investigations, by DTSC scientists and engineers as well as myself, could find no objective information that would warrant such activities. The reports we used were those selected by OEHHA for the review, data logs in the Midway Village site files, and the 1999 soils investigation of similar soil contamination at the adjacent Bayshore Park, conducted by Lowney Associates on behalf of the City of Daly City. VOC sampling was conducted there also, none were found. The latter reference is not cited by OEHHA.
2. The document also states on page 12 "Therefore, when the soil gas investigation is conducted..." Statements definitively prescribing future field activities to be conducted by DTSC are not within the scope of an objective evaluation of DTSC's activities in 2001-2002,

David Siegel
April 28, 2006
Page 3

3. Statements are made on page 14 of the report, reiterated in the conclusions on page 21, criticizing the protocols used in the indoor air sampling event at Midway Village. No statements are made with regard to the rationale for the chosen protocols.

These protocols were agreed to, in consultation with scientists from the California Air Resources Board (ARB), so that the results could be directly compared with extensive indoor air sampling for PAH compounds already conducted by ARB in northern and southern California. The sampling data are reported in Appendix E of the exposure Assessment document which accompanies the ARB publication "*Benzo[a]pyrene as a Toxic Air Contaminant*". The exposure assessment document may be found at http://www.arb.ca.gov/toxics/id/summary/benzoapyrene_A.pdf

4. If specific references are to be cited regarding the sampling and characterization of manufactured gas plants, every effort should be made to use those most currently available. The report cites the 1987 Remediation Technologies report on management of manufactured gas plant sites. This has supplanted by the following:

Hayes, T.D., Linz, D.G., et al., Management of Manufactured Gas Plant Sites, Volumes I and II, 1996, Amherst Scientific Publishers, Amherst, Massachusetts

This updated series acknowledges that the weathering process results in the loss of benzene from manufactured gas plant wastes. It also describes the careful segregation, when performing a risk assessment, of data gathered from an area where a fuel tank was buried, (such as the one removed from the adjacent, and down gradient, Martin Service Center) from manufactured gas plant residuals. Please note our earlier comment in our correspondence of March 9, 2006, attached to the report under review. This analysis matches our experience with manufactured gas plants that used crude oil, rather than coal, as the starting material for manufactured gas production. The experience of the DTSC scientists and engineers has been that lampblack waste from the facilities using crude oil has not been shown to contain benzene, where the coal tars from coal gasification could serve as a reservoir for benzene and other volatile compounds.

David Siegel
April 28, 2006
Page 4

Once again, I hope that these comments are helpful. Please contact me at (916) 255-6634, if you have any questions on the content of these comments. You can also contact Barbara Cook at (510) 540-3843.

cc: Val Siebal
Chief Deputy Director
Office of Environmental Health Hazard Assessment

Chuck Salocks
Staff Toxicologist
Office of Environmental Health Hazard Assessment

Dorothy Rice
Deputy Director
Site Mitigation and Brownfields Reuse Program

Comments from Mr. Michael Dorsey

Dorsey, Michael" <Michael.Dorsey@sdcounty.ca.gov> 5/2/2006 2:51:02 pm

Dave,

This is acceptable to me.

Sincerely,

Michael Dorsey, Chief
Hazardous Materials Division
County of San Diego Department of Environmental Health
(619) 338-2395

Appendix E:
Addendum to the Report by the
CEJAC Members of the Report Review Committee

**Report to The Cal/EPA Environmental Justice Advisory Committee
on the
Review of Midway Village Site Remediation**

Site History and Purpose of Review

Overview of Site

Timeline of Testing and Remediation Activities

Charge to the Office of Environmental Health Hazard Assessment

Environmental Justice Advisory Committee Questions

1. What was the “standard of care” at the time the site was identified, and was it met?
2. Has the “standard of care” changed, and have the changes been addressed at Midway?
3. Is the “standard of care” adequate now to support environmental justice?

What was the “standard of care” at the time the Midway Village site was identified, and was that standard met?

Site identification

Site characterization

Site remediation

Public participation

Public health assessment

Has the “standard of care” changed since the site was identified, and have the changes been addressed at Midway?

Site characterization

Site remediation

Community health analysis

Environmental Justice Recommendations

Comparison to other site remediation projects

Is the “standard of care” adequate now to support environmental justice?

Public participation

Site remediation goals and conduct

Post-remediation uses for site

Relocation of residents during and after remediation

Ongoing health monitoring and treatment

Recommendations

Conclusions

Site History and Purpose of Review

Overview of Site: Midway Village is a federally funded (Section VIII) public housing facility in Daly City (located in San Mateo County in the Southern San Francisco Bay Area) that was constructed on a site that had previous industrial use. Of primary concern is the site's original use as a manufactured gas plant (MGP) in the early twentieth century. Subsequently, the site was under the control of a municipal power generating company (PG&E). The Federal Public Housing Authority, acquired the site through eminent domain and constructed military housing on it. During construction of the housing, contaminated soil from the MGP area of the site was used as fill on which the housing was built. In the mid-1950s, the site was acquired by County of San Mateo; the military housing was demolished in the 1970s, additional grading and soil movement was done, and Midway Village and the Bayshore childcare center and park were built in its place. In 1979, the portion of the site where the MGP operated was returned to PG&E, which now operates it as a maintenance facility.

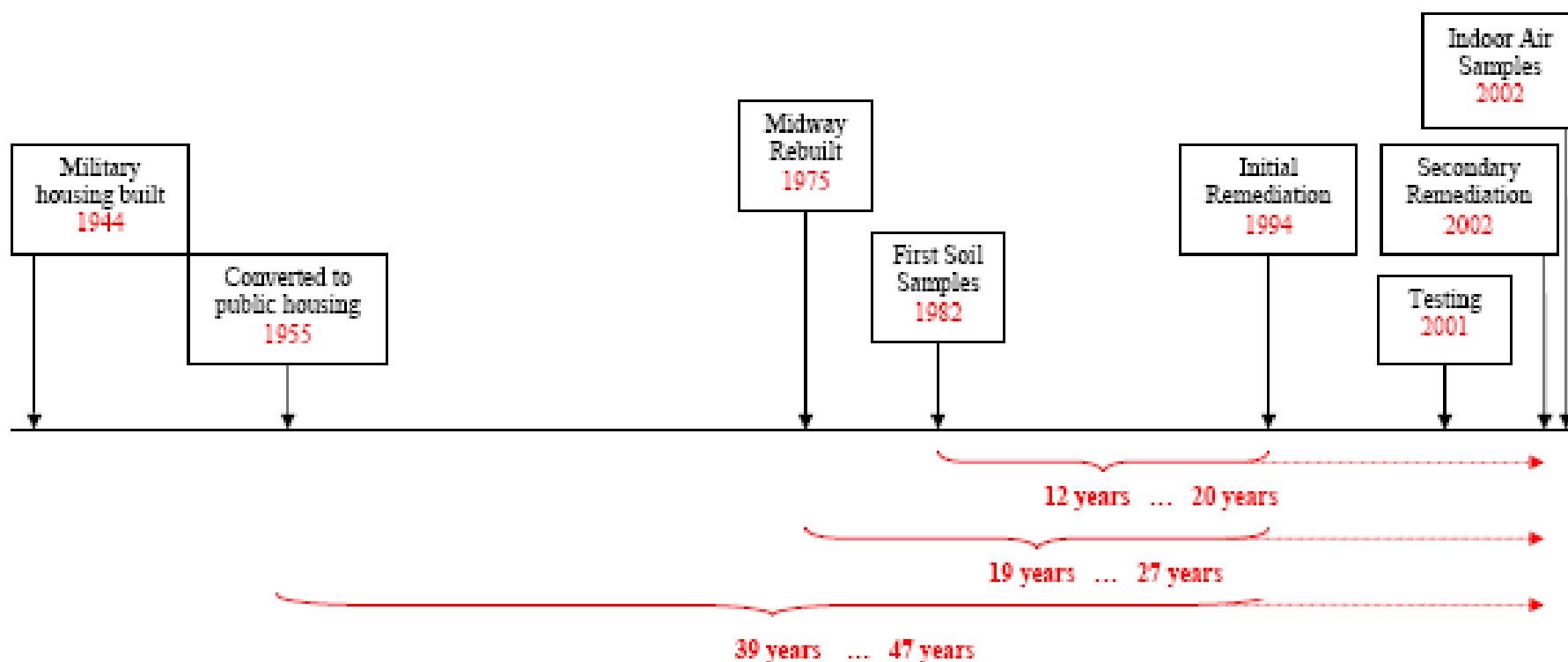
1982 – 1993: Site Testing and Identification: The first record of soil testing done at the MGP site is in 1982, by PG&E. It should be noted that the residents of Midway Village provided material for this review; they indicate records of the condemnation proceedings in the 1940s identify the presence of polynuclear aromatics, or PNAs, in the soil at the site. The records themselves were not provided, however, so this was not independently verified. Subsequent tests were done by PG&E in 1985 and 1987; all results were provided to the Department of Toxic Substance Control (DTSC) and the Regional Water Board. DTSC conducted its own sampling at Midway in 1989. In 1990, San Mateo County excavated soil that looked contaminated, and DTSC began their formal investigation of the site. Soil samples were taken in 1990, and samples in 1992 and 1993 included air and groundwater as well. In addition to polyaromatic hydrocarbons (PAHs, another name for PNAs), the groundwater sampling found cyanide, benzene, ammonia, phenols, and petroleum hydrocarbons. The residents of Midway state that hexavalent chromium has also been found in the soil, although it is unclear which testing found it or in what concentrations. In 1990, DTSC had concrete patios installed over the yards in the units on the northern edge of the housing complex, to prevent direct contact with the soil.

1994: Initial Remediation: The initial remediation plan was executed in 1994 and called for removal of impacted soil to a clean-up level of 10 mg per kg of PAHs. The soil was removed to a depth of 2 feet and replaced with 2 feet of clean fill. Soil underneath parking areas, houses, concrete walkways, and patios was not removed. No confirmation testing was done at that time.

1998: Construction and Remediation at Bayshore Park: As part of a drainage project in 1998 at Bayshore Park, adjacent to Midway Village, the City of Daly City prepared a Removal Action Workplan (RAW) for the Park. Following the remediation plan for Midway village, the RAW set a clean-up level of 10 mg/kg for surface soils, and capping of subsurface soils with 2 feet of clean fill in conjunction with institutional controls restricting further disturbance of soils.

2000 – 2001: Supplemental Testing: DTSC had the housing site tested in 2000, and then again in 2001. These tests showed concentrations of PAHs in shallow soils (depth < 6 inches) up to 16 mg/kg, expressed as equivalents to benzo(a)pyrene. At a depth of 2 feet, B(a)Peq were 28 mg/kg, and at 4.5 feet depth, the maximum found was 92.4 mg/kg. The tests also indicated the presence of cyanide, lead, and phenolic compounds. Significantly, the report notes the presence of hydrocarbons in many of the samples, present in sufficient quantity to cause “strong matrix interference problems.”

2002: Second Remediation: DTSC implemented a second remediation with a clean-up target of 0.9 mg/kg PAHs.



Purpose of Review: In September, 2005, after hearing testimony from residents of Midway Village at several Committee meetings, the California Environmental Protection Agency (Cal/EPA) Environmental Justice Advisory Committee (CEJAC) recommended that the Secretary of Cal/EPA initiate a review of the remediation actions at the Midway Village housing site. In response to that recommendation the Secretary and the Inter-Agency Working Group (IWG) at Cal/EPA requested that the Office of Environmental Health Hazard Assessment (OEHHA), which is part of Cal/EPA, undertake a review of the Midway cleanup. The IWG invited three members of the CEJAC to participate in the review with OEHHA staff, and funded a technical expert chosen by members of the Midway Village community. A staff member from the Department of Toxic Substance Control (DTSC) also participated, representing the agency that oversaw the remediation of the site.

Charge to the Office of Environmental Health Hazard Assessment: The IWG gave a very specific assignment to OEHHA, and the Office structured its review within the parameters of the assignment. Specifically, the Office was charged with reviewing available documents to determine if the scientific process was adequate to protect the health of the residents of Midway Village.

CEJAC Questions: In 2005, the Committee received presentations on Midway Village from DTSC staff and from a group of residents. Committee members held a robust discussion of the site, its remediation, and the ongoing concerns of the residents. Although the Committee members' concerns covered a fairly broad area, there are certain questions about Midway that are specifically germane to the Committee's charge under statute. The CEJAC is charged with assisting the Secretary of Cal/EPA and the IWG with identifying environmental justice gaps in the programs carried out under Cal/EPA. In light of that charge, there are three basic questions that need to be asked about the clean-up at Midway – not only as an isolated situation, but representative of the site remediation program. The questions are:

1. What was the “standard of care” at the time the site was identified, and was it met?
2. Has the “standard of care” changed, and have the changes been addressed at Midway?
3. Is the “standard of care” adequate now to support environmental justice?

This report to the Committee attempts to answer these three core questions. Considerable amounts of information were reviewed in the process of the review, however the data is (and may always be) incomplete. In addition to the materials provided by OEHHA staff, the CEJAC members participating in the review considered current local guidelines and practices, remediation guidelines and actions in other states, reports of remediation projects both inside and outside of California, technical remediation bulletins and newsletters from the remediation sector, and the report prepared by Wilma Subra, the technical consultant to the residents of Midway Village. The CEJAC members also met with Midway residents, visited the site, reviewed health data from residents, and consulted with academic, environmental, and medical experts.

Some additional information is certainly available if greater time and resources can be devoted to the review, including materials that were entered as evidence in legal proceedings surrounding the Midway site and may be available through the courts, and guidelines, reports, and case studies done throughout the United States and internationally, that are referenced but not readily available in the public domain. Other information, such as specific uses of the industrial site between 1915 and 1944, and the chemical content of soils that were removed from the site at various times without sampling, or with only limited sampling, may never be known.

This report uses the data available and relies on several key tenets of the CEJAC, as expressed in the Committee's Recommendations to the Cal/EPA IWG, September 30, 2003:

- Recommendations to collect and consolidate data should not result in lengthy delays in implementation of reasonable, feasible, strategies to reduce known and significant impacts. [Recommendations Report, pg. 16)
- Where environmental justice impacts have already been documented, or environmental justice concerns are clearly understood to exist, discussions about criteria should not prevent agencies from using available data and tools, and taking action to respond to those concerns. [Recommendations Report, pg. 20]
- It is not necessary or appropriate to wait for actual, measurable harm to public health or the environment before evaluating alternatives that can prevent or minimize harm. [Recommendations Report, pg. 13]

Finally, this review is not meant to single out DTSC or its staff, or to imply that they did not carry out the tasks required of them as the staff understood those tasks and considering the resources allocated for the work. Rather, the review is undertaken as a case study because concerns have been raised by an environmental justice community that warrant further review. Also, there appears to be a significant disconnect between the perspectives of the community members and the agency staff. Hopefully, the review will help both parties to reach a better mutual understanding of the situation at Midway Village, and move them closer to resolving some of the problems. Equally important, however, is to use this review to help identify and address broader programmatic gaps that may prevent this Department (or the others of the Boards, Departments, and Office, a.k.a. "BDOs") from achieving Cal/EPA's objective of environmental justice for all Californians.

Question 1: *What was the "standard of care" at the time the Midway Village site was identified, and was that standard met?*

As a matter of context it is important to note that the federal Superfund program was established in 1980, in response to the declared State of Emergency due to pollution in Love Canal. Prior to that time, there was much less awareness of these kinds of problems and a less systematic approach to identifying and addressing them. The initial testing done by PG&E was in 1982, before there were established practices for pursuing these cases, and before the common understanding of the issues surrounding MPG sites had emerged. As the chronology of events progressed, however, a national consensus among environmental regulators did develop and continues to evolve; that evolution informs the discussion of Questions 2 and 3, later in this report.

It is also important to note that the land that once housed the manufactured gas plant was subsequently divided and is now three separate parcels. For the purpose of this discussion, the term "Midway site" is used loosely to include the parcel that is now Midway Village, the parcel that is now Bayshore Park, and the parcel that is now the PG&E Martin Service Center.

Site identification- The earliest reports of soil sampling associated with the Midway site was in 1982. It was conducted by PG&E on the utility's property, and the results of the sampling were provided to DTSC and the RWQCB [ref. ERRG Report, Aug. 22, 2003, provided as Appendix A to the OEHHHA report]. The results of that sampling were not disclosed as part of the OEHHHA review, however it is reasonable to assume they showed contamination because PG&E subsequently undertook remediation at the site.

The contamination at the PG&E Martin Service Center does not constitute evidence that the Midway Village housing site was contaminated, but it does indicate that contamination was a possibility, and would warrant further investigation. It is not clear that the Department then had any established guidelines regarding the timelines for investigating areas adjacent to contaminated industrial sites. Notwithstanding, seven years passed before DTSC initiated its own testing of the site (showing slightly elevated levels of PAHs in yards along the northern edge of the complex), and no action was taken at that time. Action was taken when a San Mateo County construction crew uncovered visibly contaminated soil during a drainage project; DTSC began its formal review of the site, including more extensive testing, and, as a precaution, installed patios over the yards where the worst contamination was found.

Without knowing the results of the samples taken by PG&E during the 1980s, or the Department's guidelines for investigating adjacent sites, it is difficult to say precisely what the standard of care was at that time for identifying sites, or if it was met. Notwithstanding, eight years seems like a long time to initiate formal site testing. Once the Department had evidence of the contamination, however, they commenced remediation plans and implemented them in accordance with accepted timelines at the time. Notwithstanding, 12 years passed from the time first PG&E tests until the initial remediation occurred in 1994.

Site characterization- Tests conducted for DTSC between 1990 and 1992 showed soil and water contamination that included PAHs, benzene and other petroleum constituents, arsenic, cyanide, phenols, and ammonia. There is significant variability in the test results across the geographic site, due in large part to the fact that contaminated soil from the MGP operation was used as fill and spread over areas that may not have otherwise been contaminated. It is also reasonably possible that there were additional sources of contamination that may have their own geographic distribution patterns, and while this was not pursued previously, it should not be neglected now (see discussion under Question 2). Known and potential sources of contamination are discussed below.

- *Manufactured Gas Plants.* Widespread concern about contamination at former MGP sites was just beginning in the 1990s. Based on the early site use, DTSC staff focused quickly on the contaminants expected from MGP operations. The Remedial Investigation (RI) included 70 surface samples (6 inches or less in depth, and wherever possible in the top 2 inches of soil), and 80 subsurface samples in 20 different locations (at approximate depths of 2 ft, 5ft, 7.5 ft, and 10 ft in each of 20 boreholes) including 3 deep samples (between 20 and 25 feet deep). All samples were analyzed for PAHs. Surface samples were also analyzed for phenols and cyanides, which were found to be present below remediation targets. Subsurface samples were also analyzed for phenols, cyanides, and volatile organic compounds (VOCs). One subsurface sample was also analyzed for total petroleum hydrocarbons, metals then listed under Title 22, ammonia, sulfides, and pH. There were 19 background surface soil samples taken from a mix of non-residential and off-residential properties which were analyzed for PAHs, phenols, and cyanides.

Sampling results showed the soil at the site is composed of "silts, sands, and clay, as well as construction debris such as brick, metal, wood, glass, and concrete." [Ref. DTSC Final RAP for Midway Village, August 23, 1993]

- PAHs: *Sampling detected PAHs in 69 of 70 onsite surface samples, with a high of 176 mg/kg, and 46 of 80 subsurface samples with a high of 626 mg/kg. Offsite samples had PAHs in 17 of 19 cases, but the highest concentration was only 1 mg/kg. Of the subsurface samples analyzed, 15 showed contamination greater than 10 mg/kg and all of these were in fill. Samples were also taken at Bayshore Park and showed contamination above 10 mg/kg in 11 samples.*
- Phenols: *Sampling showed phenols in 37 of 70 surface samples with a high concentration of 31 mg/kg. They were present in 3 of the background samples at less than 1 mg/kg. Samples with phenols were widely distributed onsite, and the distribution did not match the distribution of PAHs. The RAP did not discuss results of phenols in subsurface samples.*
- Cyanides: *Sampling showed cyanides in 19 of 70 surface samples, with a high concentration of 41 mg/kg. It was not detected in background samples and the RAP did not discuss cyanides in subsurface samples. Cyanides were generally found in the northern half of the site, but their distribution was different from the distribution of both PAHs and phenols.*
- Other pollutants tested: *The RAP did not provide results for other pollutants tested, although references have been made elsewhere to the presence of ammonia and arsenic.*

The RAP also summarized the results of groundwater sampling. It indicates that 3 sample wells were drilled, with one well (W-1) influenced by irrigation (higher water table, and fresher, less salted water with a “substantially” different concentration from the other two wells). The RAP gives a general direction of water movement from east to west but states that more precise determination was difficult. PAHs were detected in W-1 (the diluted well), and W-2, with the high concentration of 33.5 ug/L in W-2. Cyanide, benzene, and total petroleum as diesel were also detected in both wells, except that benzene was not detected in the diluted well, W-1.

The RAP does not discuss the observed differences in the sampling wells. Examination of a site diagram shows that wells W-1 and W-2 are located along the northern edge of the site in adjacent storm-drain basins, whereas W-3, the well that showed no contamination, is near the southern edge of the area identified as having PAHs in the soil. By today’s standards, three sampling wells, with one being diluted from irrigation, seems like a fairly small sample pool, however, given that the chief concern at the time was focused on groundwater used for drinking, and this groundwater is brackish and therefore not potable, this sample size may be consistent with the standard of care at that time.

In summary, it was not unreasonable that MGP residues were the primary focus of the DTSC investigation, and the characterization of key MGP pollutants seems to meet the contemporaneous standard of care. Unfortunately, the RAP does not provide the results for a number of pollutants tested (although the presence of ammonia, arsenic, and other metals has been mentioned elsewhere without details provided), so no conclusion is drawn about those. There are, however, additional contaminants that result from MGP operations that should have been identified and characterized, particularly in response to the observed groundwater contamination that included other compounds.

Table 1: Summary of Contaminants & Location				
Contaminants	Surface	Subsurface	Groundwater	Air
PAHs	176 mg/kg	626 mg/kg	33.5 ug/L	<i>not available</i>
Phenols	31 mg/kg	<i>not available</i>	<i>not available</i>	<i>not tested</i>
Cyanides	41 mg/kg	<i>not available</i>	140 ug/L	<i>not tested</i>
Total petroleum	<i>not tested</i>	<i>not available</i>	130 ug/L	<i>not tested</i>
BTEX	<i>not tested</i>	<i>not available</i>	2.1 ug/L	<i>not tested</i>
Ammonia	<i>not tested</i>	<i>not available</i>	<i>not tested</i>	<i>not tested</i>
Arsenic	<i>not tested</i>	<i>not available</i>	<i>not tested</i>	<i>not tested</i>
Metals	<i>not tested</i>	<i>not available</i>	<i>not tested</i>	<i>not tested</i>
Sulfides	<i>not tested</i>	<i>not available</i>	<i>not tested</i>	<i>not tested</i>

- Petroleum products.* The MGP produced lighting gas from petroleum. Although it is understood today that the wastes from this process do not generally contain volatile organic compounds (VOCs) other than naphthalene, this was less well understood at the time. In addition, the storage and use of crude petroleum onsite creates a real and non-negligible potential for spills and leaks, common causes of contamination, and groundwater testing showed the presence of petroleum hydrocarbons.

In addition, the portion of the site that is presently under PG&E control is used as a power distribution substation and utility service yard. It is under permit with the Bay Area Air Quality Management District (BAAQMD) to store and dispense fuel. Similar activities may have occurred at the site prior to the construction of housing; the site was under utility control from 1915 until the mid 1940s but there are no records of its use because that period predates requirements for permits and records.

For many years, fuel dispensing was unregulated and spills and leaks were common. As stated, samples taken in 1992 showed the presence of hydrocarbons (listed “as diesel”) in the groundwater. Petroleum was not included as a “chemical of concern” however, in the DTSC remediation plan, because the groundwater, being brackish, was not suitable for drinking. While that may be a reasonable judgment in and of itself, it neglects the possibility of other routes of exposure to petroleum hydrocarbons, particularly when the soil is disturbed. As the OEHHA report points out, petroleum contaminants can migrate upward over time, especially when rains raise the water table level. For this reason, petroleum constituents should have been identified as COPCs for the project.

- PCBs.* Wilma Subra, the technical consultant representing residents of Midway, pointed out that many MGP sites also have PCBs contaminating the soil because old lighting transformers were made with PCBs, and these were frequently disposed of onsite. Given the size of the original parcel, and that it is landfilled wetlands, onsite disposal of old transformers is not unreasonable in this case. Although the mandate to remove the old transformers from service did not occur until after PG&E surrendered control of the site to the federal government, routine service would have required some ongoing replacement and disposal, as well as storage of parts for future use. Because there is a

reasonable question as to whether PCBs are present, testing should be done that either characterizes or rules out contamination by PCBs.

- *Other sources of contamination.* Other activities have occurred at the site during the last century, separate from the operation of the MGP plant, that could create further contamination and exposure to the residents of Midway Village. In addition to fuel storage and dispensing should, and potential contamination from PCBs, there are other less obvious potential sources of contamination. These may not have been considered as potential exposure scenarios even if more information had been available at the time. However, reviewing the site today we would also identify as possible contamination sources: solvent based cleaning operations, waste incineration, and potential onsite waste disposal. These are discussed in the context of Question 2, below.

Finally, no information has been presented that would either include or rule out contamination from other *offsite* activities that were either historical or more contemporary to the current use (i.e., fuel storage and distribution at a nearby site). This may, in fact, have already been considered and ruled out. If it has not, it should be evaluated.

Air sampling. Although several reports mention air samples taken in the early 1990s, very little specific information is available about where or how many samples were taken; the Remedial Action Plan (RAP) states that samples were downwind of the areas with high PAH concentration, and samples of total suspended particulates (TSPs) and particles less than 10 um in size (PM10) were collected. The RAP further states that onsite concentrations of PAHs were the same as offsite samples. No mention is made of sampling for VOCs. If the project had included remediation of petroleum hydrocarbons, the air quality permit would have required periodic testing of the outlet concentration from the abatement device(s), which would have documented air exposure for some constituents during the remediation phase. Based on the information available, it is not possible to conclude whether the contemporaneous standard of care was met.

Site remediation- In their review of the Midway Village clean-up, OEHHA focused on the second clean-up effort and did not review the adequacy of the first. DTSC identified PAHs, cyanide, and phenols as “chemicals of potential concern” or “COPC” for the first remediation. The initial remediation target for PAHs was 10 mg/kg. Because it was subsequently revised we can conclude that by today’s standards it was not sufficiently protective, but DTSC indicated it was based on standards in place under other federal programs in the late 1980s and early 1990s. At face value, then, 10 mg/kg PAHs seems to have been one accepted standard of care.

The issue becomes less clear when a comparison is made between two similar remediation actions overseen by DTSC that were roughly contemporary. A summary of remediation actions at the Alhambra MGP plant site in southern California (plan circa 1996, which was two to three years later than the plan at Midway) indicates a substantially different approach. The Alhambra site is a neighborhood of single family residences constructed on soil contaminated with PAHs from the prior operation of an MGP facility. In this instance the target was 0.9 mg/kg, all plantings and hardscape (walkways, patios, etc.) were removed, the soil was remediated to an average depth of 4-5 ft, and then plantings and hardscape were replaced. Soil was also removed from the crawlspaces beneath homes, but not beneath foundations nor close enough to damage them. In Midway, only exposed soil was remediated; patios and walkways were left in place, and soil was not removed beneath the homes. There is no explanation of the

differences in approach (see also Table 2). [Ref. U.S. EPA, A Resource for MGP Site Characterization and Remediation: Expedited Site Characterization and Source Remediation at Former Manufactured Gas Plant Sites, May 1999; also Cal/EPA News Release for DTSC, dated February 28, 1998: Former Alhambra Gas Plant Site Cleanup is Completed]

There is no mention of air monitoring during the remediation activities at Midway to ensure that the project did not result in exposure to the residents, and there was no enclosure of the remediation activities. Although that is a common consideration at these types of projects now, it is not clear whether it was an established practice for MGP remediation in 1994. However, the BAAQMD does now, and did then, require an air quality permit from the District for soil remediation activities where petroleum hydrocarbons are present, because petroleum constituents do volatilize and present a potential cancer and non-cancer threat to public health that should be evaluated. The District has no record of a permit application for remediation at Midway either from DTSC or from the contractors carrying out the work. This is probably because DTSC did not include petroleum hydrocarbons at COPCs for the project, but, as stated, the identification, characterization, possibly remediation, and monitoring should have occurred.

Public participation- There appears to be substantial disagreement between the residents of Midway Village and the Department about what degree of notice and involvement was afforded the residents. Chief among the complaints from the residents is that they were not notified of the presence of contamination until 1990, and that they were told by the Director of the Department that it was safe to eat vegetables grown in their gardens if the vegetables were washed first, and for children to play in the soil provided that they bathed frequently. The Department states that signs were posted, residents were warned and offered temporary relocation, and that this met their standard for participation. If the success of public participation is measured by the ongoing dialogue, cooperation, and respect between the community and the agency, then we would have to find this effort unsuccessful. In light of the recommendations from OEHHHA for additional testing, and the recommendations for further action contained in this report, a concerted effort should be made to involve the residents early in these next efforts. This should include their review of the testing plans prior to execution of the testing itself.

Public health assessment- DTSC did not conduct any public health evaluation of the residents at Midway as part of the original remediation effort. This does not appear to be unusual in terms of the standard of care at the time the site was identified. Residents report a variety of health problems, including nosebleeds, skin rashes, respiratory ailments, and cancers. It is not clear now whether there was sufficient evidence of health complaints at the time the site was originally identified to suggest that a systematic evaluation should be undertaken. Subsequent analyses done at the initiation of the residents suggest that follow-up work here is needed; this is discussed in greater detail under Question 2, below.

Question 2: *Has the “standard of care” changed since the site was identified, and have the changes been addressed at Midway?*

Site characterization- Based on current knowledge and standards, there are several areas that might not have been considered as potential sources for contamination in the late 80’s and early 90’s, but given current knowledge should be assessed. In addition, current knowledge strengthens the case for a more rigorous characterization of petroleum contamination even though considerable time has elapsed since the presence of petroleum products was first detected.

Petroleum Hydrocarbons. The OEHHA review of the 2002 remediation concludes that testing for petroleum hydrocarbons in the soil should have been done, and should be done now. This the case for several reasons, in addition to those previously discussed.

DTSC does not believe that further testing is necessary. First, DTSC states soil samples did not show the presence of VOCs. Second they indicate that there was and is no reason to expect petroleum hydrocarbons or other VOCs to be present. Third, they believe that even if there had been VOCs in the soil, they would have evaporated by now.

- *Testing results-* DTSC staff have stated that soil tests did not show the presence of petroleum or VOCs. Based on the information provided, it appears that samples taken in 2001 that were analyzed for the presence of VOCs were taken from excavated soil that had been stockpiled and not covered for some period of time. Under such circumstances, VOCs that were present would likely have evaporated. On the other hand, soil samples taken prior to excavation and analyzed for PAHs was reported as having “strong matrix interference due to the presence of hydrocarbons in many of the samples.” Recall that petroleum was found in two out of three groundwater wells, and benzene in one of those wells (but not in the one diluted by irrigation water); taken together, this indicates a presence of hydrocarbons rather than none.
- *Basis for suspecting petroleum/VOCs in the soil-* DTSC staff explain that examination of the many MGP sites remediated over that last fifteen or so years shows that MGP operations that used petroleum as a feedstock (as opposed to coal) produced wastes that did not contain volatile organic compounds. As stated previously, however, petroleum storage and use onsite provided ample opportunity for contamination as a result of MGP operations. In addition, it is possible that the petroleum products present in the soil and, particularly, the groundwater, did not originate from the operation of the MGP plant. That could explain why samples along the northern edge of the Midway housing project (adjacent to the MGP site, and where the highest PAH concentrations have been found) in 1989 showed no petroleum hydrocarbons, whereas subsequent testing of soil and water showed contamination. Hydrocarbon contamination could have occurred from fuel, as discussed previously, or solvent leakage or spills (see below) in other areas of the industrial site. During the grading a filling process that preceded construction of housing, these soils could reasonably have been moved to different parts of the Midway site; as has been shown with the distribution of phenols and cyanides, the distribution of petroleum and/or other VOCs could follow a different pattern. Groundwater movement can also redistribute the contaminants, especially over long time periods.
- DTSC has stated that there is no reason to conclude that VOCs are now present in any significant concentration, because the excavation should have allowed them to evaporate. VOCs that are present as part of heavier contamination, such as petroleum crude or diesel fuel, can actually be retained in the bulk layer for considerable time and released when events (such as heavy rains that affect the water table) cause disruption that allows them to escape. As mentioned above, soil testing in 2001 showed “strong matrix interference” from hydrocarbons

present in the soil. In addition, residents report a “nailpolish” like smell in certain areas on warm days following rains. This is typical of subsurface contamination: the rains raise the groundwater level, pushing the more buoyant hydrocarbons to the surface, where surface heat causes increased evaporation.

In summary, there is more than a reasonable suspicion of the presence of hydrocarbons in the soil and groundwater, there is evidence they are present. The nature and extent of the contamination has never been fully characterized, and no remediation done that would prevent ongoing exposure. Testing of soil and groundwater is necessary, and remediation for hydrocarbons still present should be undertaken unless the testing conclusively shows they have dissipated to such a degree that ongoing exposure is not possible.

- *PCBs and metals.* Testing conducted in 2002 by U.S. EPA found PCBs in one out of five samples taken. Samples also found lead and arsenic, but below general clean-up target levels.
- *Solvent cleaning operations.* Previously, PG&E maintained permits for solvent cleaning tanks at their service yard. The permits were surrendered, and there is no current record of the solvents used. Typical cleaning solvents in the last several decades include tri-chloroethane (TCA), trichloroethylene (TCE), methylene chloride, and perchlorethylene. All of these are toxic, some significantly so. Requirements for proper disposal of solvents came about in the last twenty to twenty-five years, and it is possible that solvents were disposed of, spilled, or leaked into the groundwater.
- *Waste incineration.* Several of the early documents provided by OEHHA note that waste incineration may have occurred on the site at some previous time (either as part of industrial activities or perhaps household wastes were incinerated at the complex before waste removal was provided. If this is, in fact, the case, onsite disposal of waste ash would have been typical until the last quarter of the 20th century and contamination with incineration residues should be considered. Compounds of concern would include metals, dioxins, and furans.
- *Other wastes.* As the OEHHA report states, there is very little data about the site between 1915 and 1944, other than it was the property of PG&E. OEHHA staff noted at one public meeting that because it was originally a wetland site that was filled in, it may be the repository of many different kinds of waste. Landfilled wastes in the presence of moisture degrade to form organic liquids and vapors, especially methane gas. In warm weather following rains, the bacteria that degrade the waste are more active and odors are more likely to appear – this could also be a source of the odors reported by the residents, but would have a very different constituent signature than petroleum contamination. While the presence and nature of possible landfilled wastes can’t be readily determined now, the possibility of the presence should inform groundwater testing based on a more current standard of care model.
- *Established literature.* In 1996, the Gas Research Institute published a comprehensive list of contaminants in soil, sediment, and groundwater at MGP sites that are of public health concern. The list includes six inorganic, non-metallic compounds (including

ammonia, cyanide, and sulfur compounds), sixteen metals (including arsenic, chromium, and lead), five volatile organic compounds (BTEX and styrene), three phenols, and eighteen PAHs. It is not clear from the data provided whether the site investigation included screening for all of these compounds; if it did not, then the site should be screened for the missed compounds.

- *Air sampling.* In 2002, indoor air samples were taken at five residences, all of which were uninhabited at the time, and in the Housing Office, and analyzed for the presence of PAHs. Furnaces were run during the 24-hr sampling, which increases the air flow into the residences. Napthalene was the only carcinogenic PAH found in concentrations exceeding 1 ng/m³. The highest detected concentration was in the Housing Office, at 151 ng/m³, and outdoor air at the site sampled at 23 ng/m³.
- *Indoor sampling should be conducted again both with and without dilution. Inhabited units should be sampled in addition to vacant units. Outdoor samples should be taken onsite, and offsite for control purposes. The sampling should also be analyzed for petroleum constituents. In addition, efforts should be undertaken in conjunction with the BAAQMD to attempt to verify residents' complaints of "nailpolish smells" on warm days following rains (or whenever the residents report the odors). The air district has an odor complaint line and established procedures for investigating odors, including, if appropriate, analyzing air samples taken at the site of the odor. In order for this to be successful, the odors must be reported immediately upon detection, to allow the area inspector time to respond.*

Site remediation- The target was revised from 10 mg/kg to 0.9 mg/kg PAH in the soil and a second round of remediation was undertaken in 2002. This is a significantly more protective standard. However, the second remediation effort, occurring four years after the Alhambra effort, did not include the same degree of safety, as shown in the table below. Much discussion and debate can surround the question of whether a given numerical target is "adequate" but the fact remains that, adequate or not, the same degree of remediation was not undertaken in two similar sites, even though the same target was ultimately used, as shown in Table 2, below. This indicates that either a uniform standard of care does not exist, or a change in the standard of care did occur, and that the change has not been addressed at Midway.

Table 2: Comparison of Midway Village and Alhambra MGP Remediations			
	Midway 1994	Alhambra 1996	Midway 2002
PAH cleanup target	10 ug/kg	0.9 mg/kg	0.9 mg/kg
Exposed soil	removed 2 ft	removed avg. 5 ft	removed 2-5 ft
Soil beneath parking	left/covered	removed avg. 5 ft	left/covered
Soil beneath patios	left/covered	removed avg. 5 ft	left/covered
Soil beneath walkways	left/covered	removed avg. 5 ft	left/covered
Soil beneath sidewalks	left/covered	removed avg. 5 ft	left/covered
Soil beneath residences	left/covered	removed avg. 5 ft	left/covered
Community type	public housing	single family homes	public housing
Community satisfaction	very unhappy	pleased, celebrated	very unhappy

Community health analysis- DTSC states that a clinic was established in the late 1990s for the residents of Midway Village, at UCSF, but that no residents availed themselves of it. The residents say they were not notified of its existence, but when they did later find out and pursued it, they found that it was not a clinic at UCSF, but rather a private clinic run by the two physicians they say served as witnesses against the community and for PG&E in ongoing litigation, and they declined to work with them. It is not now possible to determine whether a clinic did exist, but it is clear that no data from such a clinic exists.

The community has initiated a registry of their own, without assistance or guidance from public health professionals. OEHHA, as part of their review, recently inquired of the federal Agency for Toxic Substance and Disease Registry whether they might perform such an evaluation, but ATSDR did not feel it was likely to yield useful results. There are, however, several analyses that, at a minimum, warrant follow-up actions.

- *Chromosome analysis.* In 1998, some residents of Midway voluntarily had genetic sampling done and submitted the analysis to ATSDR. The analysis looked at sister chromatid exchange (SCE), and chromosomal aberrations (CA) in adults and children. The SCE analysis showed 28 of 34 adults evidenced normal or below normal exchanges, and all (24 of 24) children evidenced normal levels. However, the CA analysis showed 19 of 24 adults had abnormal aberrations, and 32 of 34 children were found to be abnormal. ATSDR noted that no information was provided about what constituted “normal” or “abnormal” said there was insufficient data about the sampling. They further stated that they knew of no useful biomarkers for assessing exposure to PAHs.

While there may be insufficient data to determine if this specific test of chromosomal aberrations indicated anything significant, it certainly raises the question why there have been no further efforts to determine if significant health effects are being observed in the community at Midway. At a minimum, there should be some follow-up with the researcher who conducted the testing. If this is not now possible, retesting seems reasonable. As it stands, there is at least some indication that 79% of adults tested and 94% children tested had an unusual frequency of chromosomal aberrations in the opinion of at least one investigator (Dr. Jesus Nemenzo).

- *Community health analysis.* As part of the litigation brought by the residents of Midway Village, Dr. Rosemarie Bowler conducted an evaluation of the health effects seen in the residents at the site. Dr. Bowler is faculty member at San Francisco State University. She has participated in and chaired national panels on the effects on communities of environmental exposure to toxic compounds, including panel reviews under the umbrella of ATSDR. The community was compared with a socio-economically matched control community in the East Bay of the San Francisco Bay Area. The evaluation showed statistically significant physiologic and psychologic health effects among the residents of Midway. Her analysis was not published; it was entered as evidence in the lawsuit. DTSC was provided with copies of all evidence in the litigation.

This review does not purport to confirm or question the conclusions of Dr. Bowler’s study. However, the existence of a study by a credible researcher that points to

statistically significant health effects does raise the level of concern about the present health of the residents, and the effects of any potential ongoing exposure. It is a matter of concern that, without any data to show that the study is in error, the conclusion of DTSC and OEHHA remains that health of the residents has been adequately protected.

Environmental Justice Recommendations- Since the identification of the Midway site, and the completion of both remediation efforts there, environmental justice has become a more prominent issue in California. In October of 2003, the Interagency Working Group at Cal/EPA accepted recommendations from the Cal/EPA Advisory Committee on Environmental Justice (CEJAC) regarding approaches to evaluating and improving the programs at Cal/EPA and its Boards, Departments, and Office to achieve environmental justice goals. These recommendations have not been used by Cal/EPA to guide their current review of remediation and public health at Midway Village. They should inform future efforts, and this is discussed more under Question 3, below.

Comparison to other site remediation projects- One measure of the protectiveness of established standards, and the current “standard of care” is to look at the standards set by other jurisdictions. The following are offered for comparison purposes, and while they do not show the current DTSC standard to be inadequate, they do show that greater precaution is currently being practiced by other jurisdictions.

- *Missouri Department of Natural Resources.* The MDNR has established an industrial clean-up standard for benzo(a)pyrene of **0.6 mg/kg**. [Ref. Missouri Department of Natural Resources, Cleanup Levels for Missouri (CALM) Document, September, 2001]. A consultation with ATSDR indicated that a highly contaminated site in Moberly used a containment tent over the remediation project to prevent the possibility of exposure of nearby, offsite residents during remediation activities. [Ref. ATSDR Health Consultation: Moberly Former Manufactured Gas Plant, Moberly, Randolph County, Missouri, 2004].
- *Delaware Department of Natural Resources and Environmental Control.* The DDNREC has established a remediation standard of **0.8 mg/kg** for benzo(a)pyrene, in areas where the future use of the site is restricted. This standard is a Delaware Non-Critical Water Resource Area Restricted Use URS value. As outlined in the Final Plan of Remedial Action for an MGP site in Wilmington Delaware, the remediation includes soil removal and capping with pavement, installation of a subsurface containment wall with passive pumps for non-aqueous liquid phase contamination, phytoremediation upgradient of the containment wall, installation of at least three offsite groundwater monitoring wells, and deeded restriction of the future uses of the property in perpetuity to **prohibit any current or future residential use** of the property. [Ref. Delaware Department of Natural Resources and Environmental Control Final Plan of Remedial Action for the Wilmington Coal Gas Site – North Parcel/OU-01, in Wilmington, Delaware, September, 2004]
- *Illinois Environmental Protection Agency.* Under the IEPA’s Voluntary Site Remediation Program (SRP), Commonwealth Edison (CE) undertook a remediation of the soil in a recreational park in the Village of Oak Park, Cook County, Illinois. The Park was installed on the site of a former MGP, and contaminated soils were

graded prior to planting. Under the agreement between IEPA, CE, the Village, and the Park District, soil was removed from Barrie Park and under its adjacent streets. The Illinois Department of Public Health, in April 1999 concluded that there were no statistically significant cancer clusters in Oak Park between 1986 and 1996. ATSDR and IDPH, in September 1999, concluded that exposure to surface soil in the park did not pose a public health hazard. In February, 2000, ATSDR and IDPH concluded that there was no public health risk from exposure to surface soil in adjacent residential yards, the Barrie Center, or the “Tot Lot”. Notwithstanding, under the voluntary agreement, Edison was required to remove park soils to a depth of 10 feet, and to a depth of 18 feet where future uses might include construction. Further, in areas of known wastes (termed “source material”) the utility was required remove soils to depth of at least 28 feet (in some cases up to 40 feet), and to any depth needed to meet the remediation target under the streets. During the clean-up, the most contaminated areas were tented, and all soil removal was done in the presence of perimeter air monitoring for BTEX and naphthalene. IEPA established Project Ambient Air Quality Standards (PAAQS) for the pollutants of concern, based on an exposure model for a 33 pound child at the fenceline 24 hours a day during the 18 month excavation. The Park was closed to the public during remediation, and a Citizens Advisory Committee was formed to oversee the remediation. [Ref: Oak Park Information Sheet, Frequently Asked Questions and Answers About the Barrie Park Remediation Project, June 2003; ATSDR Health Consultation: Review of Air Data At and Near the Barrie Park Former Manufactured Gas Plant Site at South Lombard and Garfield Avenues, Oak Park, Cook County, Illinois, undated]

- *Bay Area Air Quality Management District.* In 2005, the BAAQMD released a draft engineering review of a permit for the air pollution mitigation during the remediation of a former MGP site in Saint Helena, California. This remediation effort followed after several prior efforts, and included a dual phase soil vapor extraction system with three phases of abatement: thermal oxidation, catalytic oxidation, and carbon adsorption, with a total destruction efficiency of 98.5%. The site is within 1000 feet of a school and public notice was done to the parents of students at that facility, and three other schools within one quarter mile of the site, and to all addresses within a 1000 foot radius of the site. A phone line was set up at the District to respond to questions about the remediation activity. The permit calls for verification testing of the pollution control equipment upon startup, and includes requirements to monitor the performance of the pollution control equipment monthly and a change-out schedule for the carbon adsorption units.

Table 3: Comparison of Cleanup Actions in Different Jurisdictions

Location	PAH target	Residential Use	Air mitigation / monitoring	Community Advisory Committee
Midway, CA	0.9 mg/kg	yes	no	none indicated
St. Helena, CA	0.9 mg/kg	yes	abatement/ yes	no
Wilmington, DE	0.8 mg/kg	no, prohibited	enclosure/unknown	none indicated
Oak Park, Il	10-40 ft excav.	no (public park)	AAQS & plan/ yes	yes
Moberly Mo	0.6 mg/kg	no	none indicated	n/a
State guidelines WI	n/a	n/a	varies/yes	yes

OEHHA review of Midway- The review conducted by OEHHA was fairly narrow in scope, focusing specifically on the second clean-up effort and, within that, on whether the testing was adequate to characterize the contamination, and whether the remediation targets were achieved, and whether they were protective of public health. The OEHHA review concluded that, for PAH contamination, the testing, targets, and remediation were, in fact, protective of public health. OEHHA did recommend additional sampling for VOCs, and additional indoor air sampling, including for VOCs. Because the review did not address the questions raised by the limited health evaluations of the residents, and because it did not consider the standard of care practiced in other (more affluent) areas, it does not afford a complete picture of the situation at Midway.

One significant step forward by OEHHA and Cal/EPA in undertaking the review of the clean-up at Midway Village was funding a technical consultant for the community, of their choosing, to participate in the review. Ms. Wilma Subra made a thorough review of the effort and offered substantive and important recommendations to Cal/EPA about the need for greater soil removal efforts, the need to sample for PCBs, the shortcomings of the indoor air sampling, and the need to relocate residents, based on accepted practice in other jurisdictions.

Is the “standard of care” adequate now to support environmental justice?

Public participation- The CEJAC Recommendations of 2003 contain a long list of criteria for effective public participation. They should form the basis for future remediations, and should be addressed to the greatest extent possible in ongoing efforts at Midway, specifically in the upcoming 5 year review, and as part of any future testing and remediation. Early involvement of the public is critical in order to establish trust. In the case of Midway, there is already an environment of distrust and animosity, which will be difficult to overcome.

From the survey of other jurisdictions, the use of an advisory committee that includes affected residents would be a very positive step and should be considered as a standard for public participation in remediation activities in the future. Also of note are the Health-based Guidelines for Air Management, Public Participation, and Risk Communication During Excavation of Former Manufactured Gas Plants, by the Department of Health and Family Services at the Wisconsin Bureau of Environmental and Occupational Health.

The long-term goal of Cal/EPA is to have agency-wide guidelines for public participation. In the near term, it may be worthwhile for DTSC to prepare interim guidelines specific to MGP sites.

Site remediation goals and conduct- There is a substantial international forum held each year (in England in 2006) on the remediation of former MGP sites, technologies, sampling techniques, health effects, and other important aspects. The proceedings of the forum are available on CD for purchase, and would be worthwhile to examine. Because there appears to be some variation across the state in the remediation of MGP sites (Midway, vs. Alhambra, vs. St. Helena), and in other states, DTSC should develop standard guidelines for site remediation (including public participation, site characterization, remediation goals,

mitigation measures and monitoring during the project, and ongoing monitoring and other institutional controls).

Post-remediation uses for site- A survey of practices in MGP site remediation suggests that the standard is moving towards deed restrictions prohibiting residential uses of remediated sites where contamination is left in place and capped. DTSC should consider prohibiting residential use in these cases. If DTSC chooses to continue to allow residential uses in such situations, the Department should enhance the institutional controls that notify the public of the contamination, prevent exposure of residents, and inform residents of the potential consequences if the controls are not adhered to (including, for example, statements such as: “Do not dig in or otherwise disturb the soil. If soil is disturbed, you may be exposed to cancer causing chemicals through your skin if you handle the soil, or by breathing in the dust.”). Notices should be posted so they are visible and remind residents and visitors, and should include a phone number for reporting cracks in hardscaping, open trenches, and other evidence of soil disturbance. There should be clear and substantial consequences for the property owner if the institutional controls are not maintained.

Relocation of residents during and after remediation- A survey of practices in MGP site remediation also suggests a trend toward tenting of excavation areas where they pose a risk of air exposure to nearby residents. In a situation where residents live on the remediation site, or where other site constraints prevail, tenting may not be able to prevent exposure of residents. In these cases, residents should be provided with temporary housing elsewhere for the duration of the project. Whether to provide permanent relocation will depend on the degree to which the site remains contaminated after remediation. Where substantial contamination is left in place, permanent relocation is a more precautionary approach, and may be the standard of care for future efforts (see above). Another consideration, however should also be the extent to which residents have already been exposed – in recognition of the fact that exposure to many of these compounds, especially carcinogens is cumulative, and may in fact be synergistic. Even when the exposure has been substantially reduced, the cumulative effect of the exposure already sustained may, with a small additional increment, become significant.

Ongoing health monitoring- Where there is reasonable cause to believe exposures have occurred in the past, some systematic way of tracking ongoing health issues would be appropriate, taking into consideration the privacy concerns of the residents. In a situation such as Midway Village, a small clinic, perhaps a mobile clinic or a more limited effort associated with the local school, could provide some basic health care and conduct monitoring in a non-intrusive way. Mobile and school-based Asthma programs have proven very successful, and can also be a source of valuable data on public health and community needs.

Recommendations

- Enhanced public participation guidelines should be developed for future MGP site clean-ups. These practices should be put into place with Midway Village residents for future efforts.
- Additional testing is needed to better characterize site contamination at Midway for pollutants other than PAHs, especially petroleum hydrocarbons, but for others mentioned as well. Guidelines should be established to ensure complete characterization of MGP sites in the future.

- A review of clean-up targets at MGP sites in other areas should be undertaken, including the post-remediation uses for the sites meeting those targets. Guidelines should be established that represent the current best standard of care, and that standard should be implemented at Midway Village.
- A review should also be conducted of the standard of care in preventing exposure during remediation activities. Enclosures, fenceline monitoring, and other precautionary measures should be included.
- A comprehensive and systematic assessment of the health effects experienced by the residents should be undertaken, unless the Department concludes the analysis by Dr. Bowler is adequate. Efforts should be made to clarify or to redo the genetic testing that indicated a 94% rate of abnormal chromosomal aberrations in the children at Midway; if provocative results such as this are not accepted and acted upon, they should at least be responded to in a more conclusive way.
- In the case of Midway Village, and in other situations where long term exposures occurred, especially to children and where the residents do not have the ability to move on their own, the Department should recommend that they be made eligible for housing that is not contaminated. The Department should also place a priority on implementing some form of health tracking, and should recommend follow-up care if disease clusters are in fact identified.
- To the extent necessary and feasible, the cost of all of these enhancements should be passed on to the responsible parties.

Conclusions

The remediation activities at Midway Village began before there was a clear national understanding of, and guidelines for identifying, characterizing and cleaning-up former MGP sites. It was also a time when awareness of environmental justice issues was not well established, and public participation was poorly conceptualized as well. In that context, DTSC's initial remediation of the site should be considered reasonable and based on sound practice, even though it was subsequently brought to a tighter standard. Accepted practice for the remediation and later use of MGP sites has undergone substantial change over the course of activities at Midway, however. For all of these reasons, there are additional actions that should be taken at the Midway Village site in order to ensure that the remediation there meets current standards of care. Further, there are systematic improvements that should be undertaken to ensure that future projects meet the environmental justice goals California has set for itself. Future actions at Midway Village, and programmatic enhancements at DTSC, should be implemented with the best possible efforts to improve public participation and public acceptance of the outcomes.